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An Investigation of the Etiology and Pathogeny of Equine Chronic Arthritis (Rheumatoid Arthritis).

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The Discussion upon the Results.

Recently, Sir Humphrey Rolleston[52] surveyed some of the results obtained in the search for micro-organisms in the tissues affected with rheumatoid arthritis. He mentions that Dor[18] (1903) isolated *Staphylococcus albus*, Beddard[7] (1919) found a streptococcus in 75 per cent. of his cases, and Crowe[16] (1920) considered *Staphylococcus epidermidis albus* as the causal organism. To this list might be added the findings of Bannatyne and Wohlmann[5] (1896) who described a Gram negative bipolar bacillus, and of Hale White[64] (1902) who isolated a micrococcus. Moon and Edwards[46] (1917) made blood cultures of 40 acute and 83 chronic cases of rheumatoid arthritis, which produced Streptococci in 26 per cent., *B. mucosus* in 4 per cent., Diphtheroids in 4 per cent. and Staphylococci in 0.8 per cent. of cases, while 64 per cent. of cases gave negative findings. Rosenow[53] (1914) isolated organisms from the excised lymph glands of rheumatoid joints in 36 out of 38 cases, *e.g.*, Streptococci, 14; Anærobic coccus, 9; *B. welchii*, 9; Staphylococci, 3; *B. mucosus*, 1; Gonococcus, 1.

On the contrary, other investigators have not been able to isolate organisms from the joint tissues. Llewellyn and Jones[45] (1919) record that Muro and Almond examined 50 fluids from 46 patients representing all known forms of chronic arthritis (rheumatoid, gonorrhœal, sub-acute articular rheumatism, and infective arthritis of un-differentiated type), with the following results:—"Organisms were doubtfully present in one or two smears only. In no case were cultures obtained in all four of the control tubes, and only in four cases were cultures obtainable in two or more of the four." Cassidy[12] (1923) reported that "some years ago Mr. Percy Sergeant and I examined microscopically and bacteriologically small fragments of synovial membrane removed during life from rheumatoid joints. In only one out of fifteen cases was an organism (a streptococcus) recovered, though cultures were made from the minced synovial membrane, ærobically and anærobically, in all the usual media. I always suspected that our one positive result was due to skin contamination." Fisher[25] (1925) stated that "in my experience attempts to isolate or grow organisms from tissues removed at operation from the joints have been universally negative even in the last two groups" (*i.e.*, Fisher's "synovial" and "mixed" groups). As regards his chondro-osseous group Fisher[22] (1922) recorded that he had not succeeded in discovering the presence of bacteria in the synovial fluid.

Veterinary literature provides very little information upon the bacteriological investigation of chronic arthritis in horses. Eberlein[19] (1897) who studied the morbid anatomy of 100 "spavined" hock joints, stated that "in fresh joints I have never found bacteria of any kind in the synovia, inflamed bone or cartilage," though he does not mention either his technique or the bearing upon his other observations of these negative findings. Upon the same condition Cadeac[11] (1908) concludes that the lesions are due to organisms or their toxins from analogy with the known bacterial arthritides, but does not give details of any laboratory findings in support of his speculation. Goldberg[28] (1918) studied 65 cases of various joint inflammations in the horse and ox. Of the seven cases which can be classified under the present study, he only presents the findings of one. *Staphylococcus albus* and *B. coli* were obtained in pure culture from the right and left hocks respectively. Unfortunately, Goldberg gives no account of his technique, and from the presentation of his work it is questionable whether *post-mortem* contamination of his slaughterhouse specimens had been controlled.

The results obtained from the bacteriological examination of the present study leave no doubt in the author's mind that *the organisms isolated were due to contamination and were in no wise associated with the affection.* It would not be strictly justifiable to apply this interpretation to the works quoted above, but the inconstancy of the organisms isolated, their type similarity to the bacteria associated with contamination, the inadequacy or even the total lack of controls, demand a very close scrutiny of the technique utilised. From the opposite school the decision is clear-cut, the bacteriology of chronic arthritis is consistently negative, and with this contention the conclusions of the author's study are in full accord.

Having failed to associate the etiology of the type of chronic arthritis under consideration with a known bacterium, the author will attempt by piecing together observation with reasonable assumption to enquire how far his study throws light upon the etiological factor.

The behaviour of the articular cartilage in chronic arthritis provides an introduction to the enquiry into the pathogenesis of the disease. It has been shown that fibrillation of the articular cartilage is preceded by a focal change within the underlying bone. Gotti[29] (1880), Eberlein[19] (1893) and Cadeac[11] (1908) observed this phenomenon in their research upon spavin. Ely[20] (1923) stated that "the primary changes about the joints (in osteo-arthritis) are in the marrow in the vicinity . . . . . the changes in the bone and cartilage are secondary to them." Also, the lesion in the articular cartilage has been observed to correspond in the extent and location of its distribution with that of the primary lesion in the bone. Thus there appears to be some dependence of the articular cartilage upon the stability of its underlying cancellous bone and/or its articular lamella.

Now, since the days of Toynbee[61] (1841), Barwell[6] (1859) and Hulke[33] (1860) the opinion has been handed down that the articular cartilage derives its fluid nourishment by imbibition from the blood vessels beneath the articular lamella. On the contrary, Strangeways[59] (1920) has concluded from his observations upon the vitality of loose bodies in the joint cavity that "the cartilage of the joints may derive some if not the greater part of its nourishment from the synovial fluid." This hypothesis has been accepted by Fisher[23] (1923) to explain the nutrition of the superficial cells of the cartilage, while he has accepted the older view as to the path followed by the food supply to the deeper layers. Further, the acceptance of Strangeways' conclusions led Fisher to assume that because in fibrillation of the articular cartilage the superficial layers are the first to reveal cleavage, therefore the solution of the matrix is brought about by "toxic substances contained in the synovial fluid." But the alternative explanation upon Toynbee's hypothesis, which the author has been led to accept, is to regard the structure furthest removed from the source of nutrition as the first to manifest the effect of damage at that source. When the roots of a tree are cut, the leaves shrivel and fall before the sap has dried in the trunk. *The avascular articular cartilage is dependent for its nutrition upon the vessels in the underlying cancellous bone and its articular lamella.*

The primary morbid changes of chronic arthritis have been observed:—(1) in any one or more joints and/or their associated tendons in the same patient; and (2) in any one structure or combination of structures of a given joint, with the exception of the articular cartilage.

Of these various units the articular cartilage is the only avascular structure, so that in their distribution *the primary morbid changes are confined to tissues possessing a blood supply.*

Whatever be the nature of the causative factor, the first manifestation of its assault upon the blood vessels of the tissue or tissues selected is a vaso-dilatation, and either from the virulence or the duration of this assault, or from both, the capillary wall is constrained to permit free passage of the plasma into the surrounding connective tissue spaces. Finally, death of the tissue follows, when the function of the capillaries as the transporters of oxygen and food to the tissues is destroyed.

Referring to the focal nature of this initial injury to the structures, Strangeways[58] (1918) stated that "when an inflammatory process attacks the articular cartilage or bone of a joint, inflammatory changes do not, except in rare circumstances, involve the whole of the epiphysis, but are usually confined to the quite superficial cancellous spaces, and superficial osseous trabeculæ. As a rule, these changes are not found over the whole of the articular surface but only in isolated areas . . . . . ." But this phenomenon is not confined to the articular bone, it has been observed around the vessels entering the non-articular bone, within the marginal zone supplied by Hunter's *Circulous Vasculous Articuli*, and also within the capillary bed of the reticular tissue of the capsule, tendon, or tendon sheath. *Focal death is a characterisic common to all structures liable to the initial assault.*

Certain *data* have been accumulated regarding the nature both of this focal death and of the reaction in the tissues to which it gives rise. Within the soft tissues the foci of necrosis are multiple and each focus is of microscopic dimensions. A structure thus affected, *e.g.*, the synovial lining of the capsule, reveals a normal structure to the naked eye, is of a rose pink colour or dotted with petechiæ here and there. On the contrary, the focus within the bone (an absorption, osteoporosis, or the halisteresis of German writers), is of macroscopic size. This naked-eye loss of tissue is visible not only in the articular bone, but also, as Bretschneider[8] (1910) has pointed out, in the non-articular bone at the site of entry of the minute vessels from the periosteum. Either in bone or soft tissues examination of these foci has failed to reveal any evidence of parasitic organisms or of the products of their activity.

At a later stage, when the synovial lining shows villous proliferation, when the marginal zone is occupied by a soft vascular "pannus," and when the site of entry of vessels into the non-articular bone reveals the origins of exostoses, the reaction of the tissues to the causative factor is made manifest. The periphery of a focus is then occupied by granulation tissue, amid which phagocytic cells containing foreign material and occasionally a type of giant cell are seen. But the reaction is more than a replacement fibrosis or repair, for young connective tissue cells and wandering phagocytes are widespread throughout the sections. In addition to the peri-capillaritis diffusa, everywhere new capillaries have opened up far in excess of the normal. The macroscopic villous proliferation of the blushing synovial linings, the vascular pannus or "prelipping" formation of the marginal zone, the young outgrowth from the non-articular bone, all are far in excess of the functional requirements of the structures. These structures react to the causal factor by hyperplasia. Thus in the *soft structures the microscopic focal loss of tissue is transitory, it is rapidly compensated, but still more it excites an hyperplasia.* The focal loss of tissue within the *non-articular bone is macroscopic, but it also promotes growth far in excess of the requirements for its repair.* On the contrary, the focal destruction within the *articular bone*, as will be shown, is not followed by hyperplasia provided the normal mechanical functions of the joints are maintained.

The nature of the lesion in the articular bone has been revealed as a focal destruction by some factor which is associated with the blood vessels. There is absorption of the inorganic salts together with death of the more highly-endowed cellular elements, and further, there is at the time of death no evidence of a compensatory reaction upon the part of the healthy tissue at the periphery of the focus. The destruction in comparison with the other changes is *sudden.* It will simplify further discussion to consider the pathogenesis of the articular bone lesion as applied to an epiphysis of a long bone, though the identical changes are found within the short bones, such as those of the carpus or even of the various sesamoids. On saw-section through an epiphysis, the lesion may be situated (a) adjacent to the articular lamella, (b) centrally and independant of the articular lamella, (c) towards the periphery and adjacent to the marginal zone, or (d) in any combination of these locations, and thus more widespread. Again, in its distribution the lesion may affect only one or both epiphyses of a joint, with or without a lesion of the articular cartilage or cartilages.

There are many cases of chronic arthritis in which, as Stockman[57] (1920) says: "The subchondral changes occur before the articular cartilage is affected," so that "there may be very considerable deformity and flattening of the head at a time when the articular cartilage is still intact." This observation, together with that of Nussbaum[47] (1923), who by division of the vascular supply to the head of the femur in dogs produced necrosis of the bone though the overlying articular cartilage remained healthy, had been utilised to propound the view that the articular cartilage is independent of the underlying cancellous bone. Now Murk Jansen[39] (1920) recorded that "the entire pressure of muscle action and gravitation in the epiphysis is transmitted by the cancellous tissue," and thus from the previously recorded *data* it is conceivable that when a focus of cancellous bone which normally supports the stresses of body weight and progression has been destroyed, and destroyed so suddenly that the healthy trabeculæ have not had time to compensate the loss, the continued operation of these stresses will result in the collapse of the focus. Provided that the location of this focus does not endanger the nutrition of the articular cartilage, the deformed epiphysis retains its non-vascular cartilaginous buffer. More commonly, however, the focus is found to involve the articular lamella, and then morbid changes of the overlying area of articular cartilage are made manifest.

Throughout this study only one example (Case No. 1) was found illustrating the previously recorded observation that only one epiphysis may be affected. In this case the erosion of one articular cartilage was opposed by a metaplastic overgrowth of the other cartilage. It would appear that it is this combination of changes to which Nichols' and Richardson's[46] concept applies, *viz.*, destruction of one articular cartilage is met by a compensatory overgrowth over a similar area on its opposing cartilage. In the vast majority of cases both epiphyses together with their articular cartilages are affected, and further, the lesion of the two interdependent structures of the one epiphysis is duplicated in its opponent. Smith[56] (1893) stated that "in all forms of the true disease (spavin) the ulceration on one surface corresponds detail for detail with ulceration on the opposing surface." Eberlein[19] (1897) and Kruger[43] (1906) made similar observations. Few authors have attempted to offer any explanation for this phenomenon. Goldberg[28] (1918) merely states that it is due to the presence of an irritant within the joint cavity, but does not define the nature of the irritant, how it arrived within the lumen of the capsule, or why it should select exactly opposing circumscribed areas of the articular cartilages and the underlying bone. The German writers regard the duplication as due to the rubbing of a healthy cartilage upon the eroded area of its opponent, a type of "kissing ulcer." This latter view, presupposing as it does a primary focus in but one epiphysis, is contrary to the previously recorded observations that in such cases the healthy cartilage proliferates, and further, as Key[42] (1833) has shown, the femoral condyles and opposing articular surfaces of the tibia may reveal extensive changes in spite of their

separation by healthy and intact semilunar discs. It would appear to be far more reasonable to recognise, firstly, the vascular associations of the causative factor, which as previously shown, produces the diversity in the location of injury, and secondly, the dependence of the articular cartilage for its nutrition upon the underlying articular lamella. Upon this basis *the origin of the lesions upon opposing epiphyses*, each with but occasional minor differences the replica of the other, is capable of interpretation—it *is a twin-birth, via* the vascular system.

The changes which the area of articular cartilage undergoes upon destruction of its nutrition have been described under the terms "fibrillation" and "erosion," these changes ending with its complete disappearance and the exposure of the articular lamella. Fisher's[23] (1923) observations upon the persistence of the articular cartilage of traumatic loose bodies, the bone of which is dying or already dead at the time of examination, are not, as at first sight, contrary to the author's concept of the dependence of the articular cartilage upon the stability of the articular lamella, since, as Strangeways has shown, an adequate pabulum may be found in the synovial fluid, but they are evidence of the *enormous power of resistance to adversity with which the articular cartilage is endowed.* In the light of Redfern's[50] (1851) and Fisher's[23] (1923) experiments upon the healing of the articular cartilage, it may be said that its power of recuperation is in inverse proportion to its property of resistance. It is the vitality of the cartilage that leads to the conclusion that *its disappearance through the stages of fibrillation and erosion is a slow process, in contradistinction to the rapidity of the focal death in the other structures.* The rapid death of a focus of bone is followed by a slow death of a cartilage; and further, as the cartilage progressively disappears, vascular granulation tissue is seen to enter and refill the destroyed cancellous spaces; *the bone lesion is repaired*, but *the cartilage is lost for ever.*

There is a variant both in form and degree from the more common lesions of the bone and articular cartilage just reviewed, namely, "furrowing." This lesion, to which scant attention has been paid, has been described in horses by Smith[56] (1893), Bretschnider[8] (1910) and Goldberg[28] (1918), while in man there are references to it in the writings of Volkmann[63] (1892), Nichols and Richardson[48] (1909) and Boyd[9] (1925). In the earlier stage the changes in opposing atricular cartilages are confined to the area bounded by the ridges and furrows, while at the same time the absorption in the sublaminal spaces is diffuse and only evident upon microscopic examination. At an advanced stage the area of the linear furrows is bereft of its articular cartilage, which at the greater part of the residuary areas is undergoing fibrillation. Meanwhile, the underlying bone has sclerosed. The appearances suggest that the initial destruction of the bone, though diffuse, is of a slight and dilatory nature, and since the disappearance of its cartilage is equally slow, the bone is able not only to repair its defect but also, by sclerosis, to prepare for its eventual exposure. Thus the changes embraced by the term "furrowing," though of a similar creation to, are of a more chronic nature than, those previously described. Further, it is conceivable that, as the point transmitting the pressure of body and muscle weight travels over the fibrillating cartilage along an arc of a circle in the line of movement, the solution of the mucinous portions of the matrix of one cartilage will form a furrow into which the firmer collaginous portions of its opponent will fit as a ridge. Thus it is inferred that the form and location of the slow, destructive changes characterising "furrowing" are due to the intervention of the normal mechanical forces of the joint.

Reverting to the stage of the more acute lesion in which the erosion of the cartilage exposes the articular lamella, it is seen that one of two courses may be followed. If the movement of the articulation has ceased from any given cause, the granulation tissue merging on to the eroded area of one surface becomes applied to, and interwoven with, the granulation tissue of the opposing erosion. Subsequent metaplasia converts this fibro-vascular junction into a bony ankylosis. On the other hand, if free movement of the articulation persists despite the lesion, then the exposed granulation tissue becomes stimulated by the friction of movement and pressure to the formation of a dense scar tissue, in which lime salts are deposited, resulting in a surface layer of sclerosed bone. Thus, to compensate the loss of their cartilaginous buffers, the opposing exposed bones form bony scars, which, owing to the continuous application of the normal mechanical stresses, become thickened, hardened and ivory-like at the expense of the underlying cancellous bone. Throughout the course of either of these sequelæ the regeneration of the cancellous spaces proceeds, but, unlike the soft tissues, there is no hyperplasia, no production in excess of the functional requirements, *so long as* the normal mechanical factors continue to operate.

Ziegler[67] (1898) considered the "lipping" of the marginal zone as due to a combination of bone absorption in the cancellous spaces of the epiphysis and bone production at the articular margin. Fisher[23] (1923) regarded "the well-known lipping of the articular margins" which in his experience "always succeeds the degenerative changes in the central area," as Nature's attempt by increasing the surface bearing area to compensate the loss of the central articular cartilage. These views contain two premises which are not applicable to all manifestations of the affection. In the first place, lipping is regarded as secondary to a primary lesion in the bone and/or its overlying articular cartilage. But both lipping and osteophyte formation have been found *in the absence of* any lesion either of the articular cartilage or of its subjacent bone; also, conversely, as Gotti[29] (1880) recorded, osteophytes may be entirely absent though lesions of the articular cartilage are present. Secondly, not only do some osteophytes show no evidence of articulating with an opposing surface, but, as in Case No. 33, the entire proliferated marginal zone of a joint may reveal radially directed grooves which are occupied by hyperplastic synovial villi. The compression by opposing surfaces of these delicate and sensitive vascular villi would, if maintained in spite of the pain, lead to their destruction. It would appear to be more reasonable to *consider the proliferative changes in the marginal zone as analogous to those on the non-articular surfaces of the bone*, which result in exostoses. Both varieties arise in direct relationship to blood vessels; both follow a similar structural development which may be traced as an hyperplasia following focal destruction; both may be found to merge imperceptably into one another, and both fail to show any consistency in their distribution—*e.g.*, the whole or any one portion of an articular margin may be affected, also exostoses may be anterior or posterior, single or multiple, "high" or "low." These common properties suggest common causes. Taking two clinical examples of these new formations, one from man and one from the horse, it is seen that they (Heberden's nodes and articular ringbone) are invariably associated with chronic arthritis, and further, that both may arise in the absence of lesions in other structures of the joint. In other words, many, possibly the majority, of the cases of Heberden's nodes and ringbone may develop as a result of an initial vascular injury by the causative factor of chronic arthritis. On the other hand, any factors which alter the alignment of the articulation may expose a part or the whole of the vascular marginal zone to a pressure and attrition beyond the limits of physiological normality. In consequence, the elements of the zone undergo a compensatory metaplasia, that is, as pointed out by Arbuthnot Lane[44] (1886) and Burt[10] (1913) in the case of Heberden's nodes, mechanical irritation may also lead to the formation of new bone at the articular margin. Just in the same way, any divergence from the normal mode of progression of a horse may expose its phalanges to local injury, at the site of which an exostosis may arise. Thus the proliferative changes of the marginal zone (lipping and

osteophytes), and of the non-articular bone (exostosis), may arise as a result either of a primary injury associated with the capillaries, of abnormal mechanical stresses, or of both.

The power of various mechanical factors in determining or modifying the pathogeny is manifest in the development of changes within the capsule. The measurements of synovial fluid have shown that the joints and tendon sheaths, in varying stages of the affection, contain an increase over their normal fluid content. Clinically, this increase of fluid may be made evident in one of two ways, *viz.*, firstly, it may be an evanescent swelling, appearing and subsiding somewhat rapidly, repeating itself with each exacerbation; or, secondly, the increase may, from the outset, be gradual but of a permanent nature. Histologically, there is in the initial stages preceding focal injury an acellular effusion into the connective tissue spaces, and thence into that great tissue space, the lumen of the joint. Thus, an initial augmentation of the fluid is associated with the effusion following an assault of the causative factor. But provided no large-scale injury follows, the absorptive properties retain at least a part of their vitality, or, in other words, if the causative factor has been stayed in its assault the sequel is resolution. On the other hand, a repetition of such assaults (the clinical exacerbations) or the attainment of its objective by the initial assault, modifies the absorptive properties, leading to an accumulation of fluid and a corresponding increase of pressure within the joint cavity. From dissection in the earlier stages of their formation it has been observed that the herniæ represent small pouches of the synovial lining within the paths of least resistance through the capsule, formed at a time when those paths are distensible, *i.e.*, long before advanced metaplastic changes could operate as a powerful resistance to the pressure from within the joint cavity. Thus it would appear that herniæ of the synovial lining are the result of an increased intra-articular pressure which is generated by the association of an abnormal fluid content with the constant movement of the articular structures. These herniæ in the horse are, as Eve[21] (1882) has pointed out, analogous to the synovial cysts in man described by Morrant Baker[3] (1877).

In 43 per cent. of the cases studied, the tendons and their sheaths showed varying degrees of morbid change corresponding with those described in the joint capsule. The initial lesion affects the vascular reticular tissue within the sheath and between the fasciculi of the tendon; and the subsequent hyperplasia and metaplasia are of the same character as traced in the joint unit. Eventually the tendon may be terribly deformed by the contraction of the fibrous tissue, or by the development amidst its fasciculi of fibrocartilaginous nodules and even of cylinders of bone. In their site of origin and in their development the morbid changes in the tendons are analagous to those of the joint structures. Now Dieckerhoff[16*], (1875) observed that the tendons and tendon sheaths may become affected previous to, or at the same time as, their related joint, and concluded in consequence that the arthritis (*i.e.*, spavin) originates in a chronic inflammation of the flexor metatarsi sheath. While this observation does not represent the whole truth, in that tendons may only reveal the initial stages of a change which is advanced in one or more structures of the related joint, yet it gives confirmation to the author's conclusion that the time of origin of the morbid changes in any given tendon is not necessarily correlated with that of the changes in the joint. The common anatomical and physiological properties of the tendons and the diarthrodial joints, as exemplified in the ensheathing of the biceps tendon by the synovial lining of the shoulder joint, illustrate the significance of associating their respective morbid changes, if only to recognise, with Kruger[43] (1906), how *modification of a tendon may in turn alter the mechanical stresses upon the structures of one or more joints.*

The evidence of one change begetting further changes, which has been accumulating throughout the course of this discussion, is confirmed by the behaviour of the blood vessels of the capsule. Following upon their numerical increase in the stage of hyperplasia, the vessels become surrounded by concentric rings of fibrous tissue (*pericapillaritis diffusa*), which, with the advance of metaplasia grow more and more dense. To these perivascular changes is added the contraction of the proliferated capsular fibrous tissue, a combination of forces resulting in the occlusion of many of the blood vessels. This gradual elimination of their sources of nutrition leads to a wasting of the more highly-endowed connective tissue elements, as manifest in the smooth porcelain-white synovial linings of the advanced cases. Thus, in the late stages *the nutritional atrophy of the soft structures is secondary to their own proliferative changes.*

The discussion has revealed that not only may many variable degrees of change (*e.g.*, initial hyperæmia, effusion, focal necrosis, hyperplasia, metaplasia and atrophy) be shown as between one joint or tendon and another of the same patient, but also as between one structure and another of any given joint or tendon. Also it has been found that as the progress of change within the structures is modified or determined by mechanical stresses, so, conversely, these physical forces are changed by the alteration of the structures. As an example, the deviation of the joint movement may be due to such structural alterations as the absorption of bone producing variation of its contour, the interlocking of osteophytes, and the condensation and retraction of the capsule or tendons; conversely, altered mechanism may induce the formation of lipping. Thus, *once the initial injury has excited an hyperplasia the subsequent changes result from the reciprocal operation of two diverse factors—tissue response and mechanical stress.* Though the corroboration of these two diverse factors is constant, it is also progressive and deliberate, as reflected in the clinical course of the structural changes leading to deformity of the affected region.

In spite of the anatomical classification utilised by veterinary authors for their description of chronic arthritis in horses, it is possible to summarise the clinical manifestations upon the concept of a generalised affection. In such a summary it is found that *horses develop an arthritis of which the cause is none of the known specific agents* as detailed in the Foreword. Its onset is as variable as its end results. While in some cases, possibly the majority, the onset is insidious, with pain, manifested in lameness, as the initial sign, in other cases a hot, swollen and painful joint with or without constitutional upset may be the first evidence of disorder. The signs may disappear for a period only to recur (the intermittent rheumatoid type of Case No. 14) or they may slowly progress to the development of some abnormal structural sign. Structural changes may constitute in some cases the first evidence of "unsoundness" and then the origin is a matter of conjecture. But, as a general rule, the affection *slowly progresses* until altered functions, pain, or structural changes, render the animal unfit for work.

Summary of the Discussion.

The pathogenesis of the chronic arthritis under discussion may be more succinctly described in two phases.

1. The *initial or pathogenic* phase in which the swaying fight for ascendancy between the causative factor and the patient's resistance gives rise to a complex of clinical signs and to the morbid changes of inflammation. These changes, hyperæmia and acellular effusion, may be resolved, or, alternately, pass into focal injury.

The operations of the causative factor are confined to the vascular connective tissue and its initial assault is launched when these tissues are in the first bloom of maturity.

The character of the factor's invasion of this wide area of tissue is as variable as its duration within the patient. The invasion may be violent or weak, in one or more sites, it may subside, leaving injured tissues to respond by the changes of the second phase, and when this has occurred it may return to the old or to a new site. Such a factor has eluded recognition by bacteriological and histological methods.

No evidence of a pathogenic organism or of the effects of its activity has been found within the structures at the various stages of the disease. Again, the presence of any type of disease in organs other than those of locomotion, either previous to, or associated with, the onset, was not common to all cases, and in no case were the so-called "septic foci" found.

2. The *second phase* (*osteo-arthritis*) embraces the varied changes portrayed by the response of the structures to the destructive effects of the primary phase. But this response is complicated in that the structures are called upon not only to repair their defects, but at the same time to supply the functions for which they were created. This double demand converts repair into hyperplasia, normal functions into abnormal stresses and pressures, and these structural changes and altered mechanical forces in turn result in further abnormalities. That is, to fire the train of changes of this second phase there is required an initial destruction of the nutrition to a part or whole of any joint unit. But the primary stages of chronic arthritis are not the only factor which satisfies this requirement: bacteria, toxins, trauma, neoplasms, etc., are equally capable of so doing. Thus these complex changes of the second phase, changes termed osteo-arthritis, may, in the words of Sir Archibald Garrod,[27] "result from any form of articular disease provided that it be of sufficiently long standing," and do not in themselves constitute a specific entity.

Conclusions.

The findings have been summarised at the end of each section of the paper, so that it is only necessary to present the general conclusions:—

1. Of 147 horses examined before and after slaughter 14 per cent. were affected with chronic arthritis, comparable to the rheumatoid arthritis of man.

2. Bacteriological, histological and cytological examinations of the affected fluids and tissues have failed to identify the causal factor. The observations throughout were controlled with specimens from normal horses.

3. *The initial changes*, which are confined to the vascular connective tissues of the joints and tendons, are those of inflammation ending in resolution or focal necrosis. *The subsequent changes*, known as osteo-arthritis, are due to the interaction of correlated pathological and physiological phenomena, and are common to any of the specific types of arthritis.

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Appendix.

Case Records (summarised).

No. 1:—Bay cart gelding, aged 18 years. Whole life spent at farm work; sold for slaughter because gradually becoming more and more lame on all four legs in spite of treatment. Slaughtered 30th September, 1924.

Left fore limb. Antero-posterior linear furrowing of articular cartilage of opposing surfaces of humerus and radius. Triangular bean-sized areas of erosion in direct opposition on articular cartilages of posterior halves of os magnum and large metacarpal bones.

Right fore limb. Osteophyte formation on inner quadrant of the periphery of articular head of humerus 7·0 cms. long, 1·5 cms. broad. In centre of glenoid cavity of scapula, two white opaque hard bodies each of size and shape of a grape seed, and composed of fibro-cartilage embedded in the articular cartilage but raised above it's superficial surface. Exactly opposing these bodies, the articular cartilage of head of humerus contained an irregular erosion with puckered edges and a floor of white fibrous tissue. Synovial lining of the entire shoulder joint congested. Opposing areas of erosion present on os magnum and large metacarpal, similar to those on left carpus. A prominent exostosis, "ringbone," arose from inner border of os suffraginis in its lower third. Well-developed "side bones" present.

Right hind limb. Articular cartilage of external condyle of femur was uneven and of a deep purple hue. Marginal zone intensely congested and showed early lipping.

No. 3:—Black Shire gelding, aged 16 years. Since purchase 10 years ago, had worked at general city cartage. Apart from occasional febrile attacks had suffered no serious illness. Once or twice had been reported lame in hind limbs from suspected "jarred tendons." Swelling of off-fore carpus first observed 5½ years ago, had gradually been getting larger, and lately flexion of the joint had been incomplete. Patient had never been lame from carpitis, and always able to lie down without any apparent difficulty. Slaughtered 13th October, 1924. Only off-fore limb, from mid-radius downwards examined.

Right carpus. After removal of the normal skin and subcutaneous tissue the circumference of the deformed carpus measured 55·6 cms. at level of inter-carpal articulation. Deformity mainly due to presence of two large bosses clothed by anterior annular band. Sheath of extensor pedis hung down over large metacarpal as a pouch whose thickened, densely-fibrous wall was deeply injected throughout with recent hæmorrhage. The tendon itself was normal. With this exception, all the extensor and flexor tendons and their sheaths at carpus showed no structural changes, though courses of extensor pedis and metacarpi magnus were deflected inwards by the deeper seated changes.

The outermost of the above mentioned bosses, 5·5 cms. above below, 10·5 cms. side to side, and 2·75 cms. thick, lay in front of carpus spreading externally over edge of external lateral ligament. It consisted of two separate pouches: (*a*) A median pouch, shape and size of a Brazil nut, protruding forwards between sheaths of extensor metacarpi magnus on its inner side, and of extensor pedis on its outer side. Its smooth synovial lining communicated with cavity of radio-carpal joint by means of a tube-like pedicle opening at centre of antero-superior border of semilunar bone; and (*b*) an external and more extensive pouch lying external to extensor pedis, and whose multiloculated cavity communicated with intercarpal joint opposite adjacent antero-inferior angles of scaphoid and semi-lunar.

The flat round bun-shaped innermost boss, 10·75 cms. from above below, 11·5 cms. side to side, and 6·0 cms. thick, also consisted of two separate pouches—(*a*) A smaller superiorly situated pouch, size and shape of a pigeon's egg, whose cavity communicated with radio-carpal joint by means of a pedunculated opening 0·75 cms. above middle of antero-superior border of scaphoid; and (*b*) A larger inferiorly placed pouch, communicating with radio-carpal joint by means of a canal, 2·50 cms. in length, and passing within a bulky osteophyte projecting from anterior surface of scaphoid, which opened at adjacent antero-superior angles of scaphoid and semilunar.

Opposite adjacent antero-inferior angles of semilunar and unciform and lying beneath outermost boss, a fifth pouch, like a walnut, protruded from intercarpal joint, between extensor pedis on its inner side and a large osteophytic outgrowth from anterior surface of unciform.

A sixth pea-nut sized pouch projected forwards and outwards over external aspect of intercarpal joint; its inner orifice opened opposite adjacent external angles of cuneiform and unciform, being crossed at right angles by tendon of extensor suffraginis.

In each of these pouches, the walls, formed of the capsule of the carpus, had undergone proliferative changes varying from fibrosis to cartilage and bone formation. Their synovial linings showed the varying degrees of proliferative change seen in the synovial lining of the carpal joints with which they were continuous. In the latter there was marked villous hypertrophy, especially at the marginal areas. These villi occupied the minute grooves running radially across the surface of the lipped margins of the articular surfaces; in the radio-carpal joint they were of an average length of 1·7 cms.

Osteophyte formation to an excessive degree characterised the articular margins of radio-carpal joint, but was less prominent in intercarpal and carpo-metacarpal joints. Two distinct pieces of this osteophytic growth were found to be almost "loose bodies"—one, of millet-seed size, was attached by a thin fibrous pedicle to cuneiform, and the other, of similar size, was attached by a spicule of bone to scaphoid.

Complete bony ankyloses had occurred between semilunar and cuneiform, cuneiform and pisiform, trapezoid and os magnum, while both small metacarpals were firmly ossified throughout their extent to large metacarpal.

Articular cartilage of opposing surfaces on internal condyle of radius and scaphoid were eroded, with fibrous adhesions around the periphery of the eroded areas. Erosion also occurred on opposing surfaces of scaphoid and os magnum, and of scaphoid and trapezoid, but in the latter cases no fibrous adhesions were present.

Except for its somewhat muddy colour, the fluid withdrawn from the carpal joints and pouches resembled normal synovia.

Right fetlock joint. In its passage over inner aspect of capsule of the joint the supporting band of suspensory ligament was bound down by vascular adhesions to posterior border of inner sesamoid, and also to an extensive exostosis formation at upper extremity of inner border of os suffraginis. The vascular adhesions merged insensibly into hyperæmic and thickened periosteum covering anterior and external surfaces of upper third of os suffraginis, which were very much roughened by multiple rice-sized fibrous to fibro-cartilaginous outgrowths from the bone. These outgrowths, which in section have a whitish, whorled appearance with pinkish vascularised centres, are in direct continuity with the osteophyte formation around antero-superior articular margin of os suffraginis, and in this region many of them have undergone ossification. This is an early development of "high ringbone." Osteophytes also lined antero-inferior articular margin of large metacarpal. Synovial lining of joint unusually hyperæmic and somewhat thickened, with villous proliferation in its posterior aspect.

The right coronary joint shewed still less changes, with lipping of antero-superior articular margin of os coronæ, anterior surface of which in its upper third was studded with the initial fibrous whorled outgrowths of "low ringbone."

No. 4: Bay Shire gelding, aged 12 years, which had been intermittently lame for five years past with "spavin" of near hind. More recently, both fore flexor tendons had increased in thickness, so that great difficulty was experienced in rising when once down. Animal cast as incurably lame in both fore legs, and slaughtered 8th November, 1924.

Fore limbs. In both flexor tendon-sheaths from level of lower row of carpal bones to sesamoids, pronounced proliferative changes had occurred, though to more marked extent in that of right fore limb. In outer aspect of the latter a chain of new bone 1·2 cms. in diameter extended for a length of 8·7 cms., while there were macroscopic islands of bone dotted along inner aspect. These bony deposits were embedded within the dense fibrous tissue of the markedly-thickened and hyperæmic sheaths whose enveloping layer of fascia was incorporated in the fibrous change. Sheath of left fore limb did not reveal bone formation. In both cases the maximum amount of thickening occurred at junction of supra-carpal band. Neither perforans and perforatus tendons, nor the opposing synovial surfaces appeared abnormal beyond an increased vascularity between the individual bundles composing the tendons.

Antero-posterior furrowing of opposing articular cartilages of left humerus and radius; also articular margins both of radius and ulna revealed early osteophyte formation.

Small area of fibrillation of the articular cartilage present on opposing surfaces of glenoid cavity and head of humerus in right shoulder joint.

Left hind limb. Central area of articular cartilage of both tibial tuberosities left exposed by the semilunar inter articular menisci, together with opposing areas on the femoral condyles were fibrillated, having the appearance and touch of velvet pile. Inner articular margin of internal tuberosity of tibia also showed osteophytes. Synovial lining of entire stifle joint was thickened and of a russet brown colour. Narrow eroded area about 4·0 cms. in length was situated in the articular cartilage at the edge of inner trochlear ridge of astragalus, together with a similar area showing less advanced change on opposing surface of tibia. Remainder of astragaloid articular cartilage and it's opposing tibial articular cartilage showed linear furrowing. In fetlock joint fibrillation of the articular cartilage of inner condyle of large metatarsal and opposing os suffraginis was seen.

Right hind limb. In fetlock joint linear furrowing of the articular cartilage present on both sesamoids, and to a lesser extent on large metatarsal.

No. 5: Bay Shire gelding, aged 6 years. Former history on farm unknown; sold as incurably lame from "old spavin" of near hock. Emaciated and "leggy." Very little flexion evidenced at either hock. Left hock showed compressible diffuse enlargement, while right hock but slightly enlarged. No bony malformations detected. Slaughtered 15th December, 1924.

With exception of hocks, no other abnormalities found in carcase, or in limbs below carpus and tarsus.

Left hock. Diffuse gelatinous and œdematous infiltration of thickened and deformed capsule. On antero-internal aspect of tibio-astragaloid articulation the capsule bulged forwards and inwards as an oval-shaped swelling, 4·5 cms. long; a second swelling bulged backwards and inwards, and a third pouch, 6·5 cms. long, bulged upwards in front of anterior border of os calcis. These pouches were lined by grossly hypertrophied synovial lining, of a deep brown colour, as seen throughout the entire joint cavity. Fibrous bands broke up the lumena of these pouches into many varying-sized loculæ resembling a honeycomb. No cartilage or bony changes in the joint capsule detected.

Deep linear furrowing of the opposing cartilages of tibia and trochlear of astragalus had occurred to such an extent that on innermost ridge the underlying bone was exposed and eburnated. Prominent osteophyte formation present along anterior and both lateral articular margins of tibia, while early osteophytic formation occurred throughout the entire marginal area of trochlear articular cartilage. At anterior extremity of central ridge of tibia a pea-sized, smooth, shining, freely-movable osteophyte was suspended by a very delicate pedicle. No lesions of small bones.

Right hock. Villous hypertrophy, congestion of synovial lining and thickening of entire capsule, with no changes in bone or cartilage.

No. 7: Brown cart mare, aged 10 years. Cast after five years' city cartage work for incurable lameness from "bog spavin" of off-hind. Held off-hock rigid in movement and at rest entire limb maintained in incomplete extension. Capsule of true hock joint diffusely swollen from increased fluid content. Slaughtered 16th February, 1925.

With exception of right hind hock and fetlock no abnormalities found in carcase or in the limbs below carpus and tarsus.

Right hock. Capsule of tibio-astragaloid joint was very much thickened and œdematous, and merged with the increased fibrous thickening of the loose connective tissue surrounding sheath of flexor tendons. The synovial lining unusually smooth, though very much thickened, and was of a porcelain white colour. Articular cartilage of inner condyle of large metatarsal showed a bean-sized area of erosion with a smaller area on opposing articular cartilage of os suffraginis.

No. 11: Bay Shire gelding, aged 16 years, property of a city carter. During previous summer turned out to grass without shoes. Lameness had not improved, so animal slaughtered 9th March, 1925. Weakly built, with marked lordosis of lumbar region. Near fore foot deformed with a well-worn toe turned inwards, and with a short upright inner border of hoof. At rest, near fore, held flexed at fetlock and pastern, toe resting on ground, weight of body

being borne by off-fore. Forced extension of digits painful. Marked lameness with pottering gait in both fore limbs.

Mucous membrane of cardiac end of stomach was thicker than normal and contained about eighty adherent gastrophilus larvæ. Vertebral column showed no structural abnormality.

Left fore limb. Pea-sized " splint " present at junction of middle and lower thirds of posterior border of outer small metacarpal.

In fetlock joint a small quadrilateral area of erosion present in the articular cartilage of inner condyle of large metacarpal ; opposing area of articular cartilage on suffraginis was fibrillated. Entire articular margin of metacarpal showed lipping, and well-developed osteophytes present in margin of suffraginis. On apices of both sesamoids prominent osteophytes present. Capsule thicker than normal.

Anterior and lateral surfaces of os suffraginis roughened by multiple diffuse bony outgrowths, covered by, and incorporated within, a thickened and very hyperæmic periosteum. Middle of external border showed a rounded prominent outgrowth, 2·5 cms. diameter, consisting mainly of whorled fibrous tissue in which ossific spicules were present. Along its posterior border the external digital artery passed, giving off branches which lay within the smooth channels over the surface of the new formation.

Within pastern joint the articular cartilage over inner condyle of os suffraginis and of opposing articular surface of os coronae were fibrillated.

Osteophytes found at postero-internal and postero-external articular margins of os suffraginis, while anterior articular margin of os coronæ projected upwards and forwards as a lipped border with a knife edge.

The protrusions of synovial lining of corono-pedal joint between the lateral borders of os coronæ and lateral cartilages of os pedis showed proliferative changes, resulting in two irregularly multiloculated pouches which communicated with joint cavity by means of tube-like prolongations of synovial lining passing above the lateral extremities of navicular bone in front of, and around, the edge of sheath of perforans tendon. Thus, perforans sheath in which changes had occurred varying from dense fibrosis to cartilage and even to the formation of bony plaques, formed an envelope to these synovial protrusions. These proliferative changes in perforans sheath extended upwards to posterior aspect of fetlock joint, and laterally to lateral cartilages, with the ossific deposits in which (" sidebone ") they were in direct continuity. In this region posterior surface of perforans tendon was firmly united by dense fibrous adhesions to the opposing gliding surface of its sheath, while some of the innermost constituent bundles of the tendon had been converted into a solid oval cylinder of ivory bone. Thus tendon, tendon sheath, os coronæ, navicular bone, and lateral cartilages of os pedis were bound together as one fixed fibrous and bony structure with consequent loss of free movement of the joint. Pronounced osteophytes grouped round the nutrient foramina on superior border of navicular bone. Lipping of the entire articular margins of os coronæ and os pedis well marked, this new formation on the posterior border of os coronæ having been worn into a thin upwardly projecting irregular edge. Fibrillation of opposing articular cartilages had occurred. Small irregular exostoses (early ringbone) over the entire anterior and lateral surfaces of os coronæ.

Right fore limb. Articular margins of small bones of carpus showed lipping. In fetlock joint the articular cartilage of inner condyle of large metacarpal together with it's opposing surface on os suffraginis showed fibrillation, with lipping of entire articular margin of os suffraginis. Lipping of articular margins of coronary joint with fibrillation of central areas.

Synovial lining of coronary joint bulged upwards between extensor pedis tendon and os suffraginis, forming, in centre of anterior surface of latter bone, a hazel-nut-sized sac containing synovia. Thickened fibrous walls of this pouch bounded by a broad ring of roughened, irregular, bony outgrowths from os suffraginis (high ringbone). Not only articular margins but also entire anterior and lateral surfaces of os coronæ covered by horizontally disposed chains of early new-bone formation (low ringbone), which were intimately associated with extensive osteophytic deposits on inferior articular margin within corono-pedal joint. Osteophytes lined coronary process and lateral margins of pedal bone, while lateral cartilages were almost entirely converted into exuberant bony plates continuous with the nodules of bone contained within capsule of joint. Osteophytes upon postero-superior border and lateral extremities of navicular bone were more advanced than those of corresponding bone of left fore. Further, the articular cartilage of navicular and its opposing articular surface on os coronæ showed furrowing. On posterior aspect of joint the perforans sheath was considerably thickened and contained spicules of bone continuous with the ossified cartilages.

Left hind limb. Articular margins of all small bones and of large metatarsal within hock joint showed lipping, while articular cartilages of opposing surfaces of astragalus and scaphoid were deeply ulcerated. Lower row of small bones firmly ossified to small and large metatarsals. Osteophytes present on articular margins of large metatarsal and opposing os suffraginis, also slight lipping of articular margins of both sesamoids. Articular cartilages of inner condyle of large metatarsal and its opposing surface of os suffraginis widely ulcerated. Pastern joint showed slight osteoarthritic changes.

Right hind limb. The hock, with lipping of the articular margins of small bones, was the only abnormal joint.

No. 12 : Roan pony mare, aged 18 years. Cast for incurable lameness from " spavin " off-hind ; slaughtered 30th March, 1925. Subject very emaciated, with very stiff pottering gait behind. Tense fusiform painless swelling of entire off-hock obscured the bony conformation of joint. Marked crunching sound on active and passive movement both of off-hock and near fore shoulder joints.

No abnormalities found below and including carpus and tarsus of both fore and near hind.

Capsule of right hock abnormally thick but synovial lining normal. The greater part of articular cartilages of astragalus and its opposing surface on scaphoid were ulcerated, revealing a floor composed of eroded bone and very congested granulation tissue. Articular margins of astragalus and scaphoid were lipped. Fibrillation of articular cartilage on anterior aspects of both trochlear ridges of astragalus.

No. 14 : Brown Shire gelding, aged 9 years. Purchased for city cartage in 1921, when onset of articular rheumatism observed. From 1922 intermittent lameness appeared with consequent withdrawal from work for short periods. Patient became more and more stiff in off-hind. In 1924 sent to work on soft land only to become lame in off-fore. Up to slaughter, 21st April, 1925, had maintained an excellent general condition.

Right fore limb. In fetlock joint a small area of erosion of articular cartilage covering inner condyle of large metacarpal bone, together with early lipping of opposing anterior articular margins of large metacarpal and os suffraginis. Synovial lining deeply injected. A well-formed " splint " present at middle of inner small metacarpal.

Right hind limb. In hock joint a bean-shaped area of erosion on articular cartilages of anterior extremity of inner trochlear ridge of astragalus and of its opposing surface on tibia. Osteophyte formation on anterior articular margin of tibia, and to lesser extent on anterior border of inferior articular surface of astragalus.

Left hind limb. Hock joint showed early osteo-arthritis with lipping of anterior articular margin of tibia.

No. 16 : Bay cart mare, aged 10 years. For past six months had been lame behind and had refused heavy loads. At slaughter, 13th July, 1925, showed typical " bog spavin " and " thoroughpin " of the off-hock ; near hock normal. Measurements taken around the hocks : (*a*) horizontally at level of scaphoid—off-hock = 49·5 cms. ; near hock = 46·0 cms. ; (*b*) diagonally around point of calcis—off-hock = 55·0 cms. ; near hock = 50 cms. Both ovaries were cystic.

Changes in right tibio-astragaloid joint confined to a very thickened capsule, and to increased villosity of the muddy brown synovial lining.

Distended sheath of flexor perforans at hock (thorough-pin) contained 330 ccs. of sherry-coloured synovial fluid. Perforans tendon for a length of 5 cms., in its passage over posterior aspect of tarsal bones had lost its smooth surface, its superficial bundles having been, as it were, combed out into a tangled mass of short shreads. There were no adhesions between tendon and proliferated synovial lining of the sheath. The distended sheath had no communication with hock joint.

No. 17: Bay cart gelding, aged 20 years. History unknown; purchased in open market for slaughter 23rd October, 1925. Weakly built; poor condition; stiff gait in front; voluntary flexion of carpal joints restrained, forced flexion resisted. Left carpus showed a bursal enlargement upon course of flexor tendon on outer aspect of inferior epiphysis of radius. Articular margins of small bones in both carpal joints lined by early osteophytes with sharp free edges. This new bone formation was especially prominent on anterior margins of left os magnum. The bursal enlargement on left carpus due to distension of flexor sheath with hypertrophy of its synovial lining.

No. 18: Brown pony mare, aged 25 years. No history obtainable. At slaughter, 5th November, 1925, tense spindle-shaped swelling of both hind fetlocks; no heat or pain on deep palpation, but on movement there was distinct creaking in both fetlocks, with a very stiff gait behind.

Right hind limb. Capsule of hock joint considerably thickened, and the deep brown-coloured synovial lining showed villous hypertrophy. Lipping of articular margins of astragalus and opposing surface of tibia, on anterior margin of which two prominent rounded osteophytes were situated. Capsule of fetlock joint thickened, œdematous, and studded with minute hæmorrhages, whilst synovial lining had lost its normal sheen and was deeply injected on its anterior aspect.

Left hind fetlock joint showed similar changes to those of the right.

No. 19: Bay vanner mare, aged 15 years. "Bog spavin" on off-hind for several years past, increasing stiffness in action behind. Two weeks before death mare had fallen in the street, resulting in an open and infected extensor tendon sheath. Near carpus at slaughter, 3rd December, 1925, showed a widespread superficial swelling.

Right hind limb. Thickened capsule of hock distended on its anterior and internal aspects. Russet coloured synovial lining showed areas of petechiæ and generalised villous hypertrophy. Articular margin of tibia serrated by sharp edged osteophytes. Articular cartilage upon anterior half of upper surface of scaphoid had disappeared over an area 3·7 cms. by 1·8 cms., the edges of which were irregular and very thin. This area of erosion extended on to the edge of antero-superior border of scaphoid for the inner two-thirds of its extent, while its remaining one-third was lined with osteophytes. Opposing surface of astragalus similarly affected. Articular margins of small bones of hock lined with osteophytes, which on opposing margins interdigitated and so assisted the thickened capsule in resisting free movement of the articular surfaces.

Articular margins of large metatarsal and os suffraginis showed lipping, together with well-marked osteophytes on apices of both sesamoids.

Left hind limb. Synovial lining of hock hyperæmic and œdematous, though the bone and cartilage structures of tibio-astragaloid joint showed no lesions. However, there was a wide area of erosion upon opposing articular cartilages of astragalus and scaphoid, both bones being, as it were, glued together but not ankylosed by the eroded surface. Articular margins of all small bones showed lipping.

No. 22: Chestnut cart mare, aged 25 years. History unknown. At slaughter, 11th January, 1926, walked with stiff pottering gait on both fore, with restrained flexion of carpal joints. Mare of stocky build and in very good flesh.

With the exception of both carpi all joints of the limb below carpus and hock normal. Capsules of both radio-carpal joints thickened and œdematous, with generalised villous proliferation of synovial lining. Lipping of articular margins of small carpal bones more developed in left carpus. Sheaths of both fore flexor tendons thickened and showed increased vascularity; the proliferative changes becoming less marked from carpus downwards suggesting that the inflammatory process was continuous with that in capsule of radio-carpal joints.

Dorsal vertebræ. New bone formations, in the form of smooth, rounded projections within thoracic cavity, united bodies of 11th, 12th, 13th, 14th and 15th dorsal vertebræ. In median section of spine, these formations were seen to arise from opposing borders of each vertebral body bridging the intervertebral disc, that uniting 12th and 13th projected 2·5 cms. from level of vertebral border, while the remainder were of smaller size and consisted of a larger proportion of ossifying cartilage. These bony outgrowths were clothed with a fibrous tissue continuous with periosteum of vertebral bodies, interwoven with strands of the intact inferior common ligament externally, and with the inter-vertebral discs internally.

No. 23: Bay Shire gelding, aged 17 years. History unknown. Walked very stiff behind at slaughter, 11th January, 1926.

Articular margins of all small bones in both hocks showed lipping, with sharp-edged and recurved osteophytes upon opposing anterior margins of astragalus and scaphoid bones.

Large exostosis ("splint") present at junction of middle and lower thirds of outer right small metatarsal.

Dorsal vertebræ. Bodies of 5th and 6th dorsals firmly united by a large, single, smooth surfaced, rounded exostosis projecting downwards largely to the left of mid-line between origins of bellies of longus colli. On median section of spine deeper portions of exostosis were seen to consist of opaque, white, ivory bone growing from the centre of the two vertebral bodies, while the more external portions of the new formation consisted of very vascular and soft osteoid tissue. Periosteum of vertebral bodies was continued over the exostosis as a thin fibrous sheet, intimately attached to the distorted periphery of intervertebral disc, a narrow shred of which appeared on the surface to the right of mid-line.

No. 25: Bay Shire gelding, aged 9 years. Farmer cast animal as "it had never been a good worker, and lately had been constantly going lame behind." At slaughter, 28th January, 1926, had bronchitis, was emaciated, had a long back and narrow chest. It stood with hip, stifle and hock joints of both hind fully flexed in position normally assumed in micturition. When turned, pivotted around both hind, which were kept on the ground until body axis had passed through an angle of about 45 degrees, then, by flexing both hip and stifle joints to excess, it would move the leg and plant it down very heavily on the ground. Endeavoured to avoid movement of hocks, both of which were diffusely swollen and rather tense.

Central area of articular cartilage of left tibia showed an irregular, very vascular and recently-formed area of erosion, while anterior extremity of opposing trochlear surface appeared "soggy," with invasion of capillaries from the marginal zone. An earlier phase of the condition was found similarly situated in the right tibio-astragaloid joint. Synovial lining of hocks and fetlocks, and the synovial lining and wall of flexor tendon sheaths of both hind limbs normal colour but infiltrated with a gelatinous œdema.

No. 26: Bay pony gelding, aged 20 years. Worked in hawker's cart; "spavined" off-hock for several years past, but had never been laid up. Slaughtered 1st February, 1926.

Right hind limb. Lipping of entire articular margins of tibio-astragaloid joint. Large area of erosion on anterior halves of opposing articular surfaces of astragalus and scaphoid, with early osteophyte formation upon the margins. Lower row of tarsal bones firmly united with

large and small metacarpals by interlocking osteophytes which on internal aspect protruded as a bulky exostosis.

In fetlock joint, articular cartilages of inner condyle of the large metatarsal and the opposing surface of the os suffraginis were ulcerated, together with lipping of the marginal area in both bones.

No. 29 : Bay Shire mare, aged 6 years. Purchased by city haulage contractor one year previously but had done very little work owing to the development of "spavin." Had lost condition rapidly during past two months. Slaughtered 11th February, 1926.

Right hock occupied by a diffuse, soft, fluid swelling due to synovial fluid content of 42 ccs. While the capsule was normal, the highly-injected synovial lining showed considerable villous proliferation. Left hock, though manifesting a similar condition of its synovial lining, was not appreciably distended.

No. 31 : Brown vanner gelding, aged 28 years. No history obtained. At slaughter, 18th February, 1926, enlarged puffy hocks and fetlocks in both hind. Walked very stiffly behind but with no evidence of pain ; emaciated; stood with head depressed and showed a kyphos over 2nd, 3rd, and 4th lumbar vertebræ.

Both hocks presented a similar picture of villous hypertrophy of the muddy-coloured synovial linings, together with thickened capsules. Articular margins of small bones showed lipping.

In both hind fetlocks the articular cartilages on both condyles of large metatarsals and opposing surfaces on os suffraginis showed fibrillation.

No. 32 : Bay Shire mare, aged 20 years. No history obtained. At slaughter, 22nd February, 1926, in good general condition. Walked very stiffly behind but with no characteristic lameness.

Synovial lining of left fore fetlock joint considerably thickened and congested, with villous proliferation, especially marked over intersesamoidean ligament. Inner marginal zone of internal sesamoid swollen and very vascular. Early linear fibrillation of the main-bearing surface of inferior articular surface of large metacarpal. Sheath of flexor perforans at left fore fetlock abnormally distended, 12·5 ccs. of synovial fluid withdrawn, and its synovial lining was of a dull brown appearance with considerably villous hypertrophy.

Both hocks equally affected with lipping of articular margins of small bones, and fibrillation of articular cartilage covering anterior extremity of both internal and external trochlear ridges of astragalus.

No. 33 : Bay Shire mare, aged 18 years. Cast for long-standing lameness due to carpitis. At slaughter, 8th March, 1926, had a clumsy shuffling gait but no localising signs evident. Stood with right fore held forwards with flexed carpus and toe just touching ground. Right carpus was diffusely enlarged by a spindle-shaped and very dense swelling of the capsule. Both hocks creaked on movement. Bilateral wasting of the extensor muscles of thighs and legs.

Synovial sheaths of extensor tendons passing over right carpus distended with blood and synovial fluid. Walls of sheath infiltrated with remains of recent hæmorrhage, and their synovial linings thickened, together with considerable villous proliferation. Thickened sheaths of flexor tendons at carpus showed considerably less villous hypertrophy of their synovial linings.

Capsule of right carpus very thickened, while its outermost and more cellular layers upon antero-external aspect contained the remains of recent hæmorrhages. Synovial lining of all joints of carpus of a deep brown colour and considerably hypertrophied, the synovial fluid being mixed with altered blood. A thick horizontally-situated wedge of synovial lining on anterior aspect interposed itself between the anterior thirds of opposing articular surfaces of radius, semilunar and cuneiform. Appearances suggested that on account of this wedge of hypertrophied tissue the weight of limb was transmitted upon a line passing from side to side through the posterior half of carpus. Articular cartilages of scaphoid and opposing surface of os magnum eroded, the erosions spreading inwards from the anterior margins. Articular margins of all bones of carpus lined with osteophytes.

In right fore fetlock joint the articular cartilage of both inferior condyles of large metacarpal showed linear fibrillation.

Both hocks similarly affected. Capsules thickened, and the deep-brown-coloured synovial lining considerably thickened and villous. Fluid from both hocks intermixed with altered blood and contained several bean-sized clots. In left tibio-astragaloid joint organisation between one of these blood clots and synovial lining had commenced. Early osteophytes with sharpened recurved free edges lined articular margins of all hock bones. Osteo-arthritic changes in hocks of more recent origin than those of right carpus.

No. 34 : Bay Shire mare, aged 18 years. For many years on city cartage. For several months had been on light work until finally cast for "spavin" of near hind. At slaughter, 22nd March, 1926, unable to walk, and was transported in a float. General condition very good.

Right carpus showed increased villosity of synovial lining, while articular margins of small bones lined by osteophytes with sharp free edges.

Both hocks similarly affected. Russet-coloured synovial linings showed villous hypertropny, while from the synovial lining of anterior wall of left tibio-astragaloid joint a pedunculated pea-sized chondroma was suspended within joint cavity. Articular cartilages of astragalus and opposing surfaces of scaphoids showed fibrillation extending inwards from the anterior margins. Osteophytes especially prominent on anterior margin of tibiæ, lined articular margins of bones of both hock joints.

Capsule of left hind fetlock joint thickened, and its synovial lining considerably hypertrophied and of a brownish colour. Synovial lining of marginal zone of both sesamoids swollen, soft, and congested.

In its inferior aspect the synovial lining bulged as a hazel-nut-sized pouch downwards on to upper fourth of os suffraginis. Surrounding this synovial pouch was a chain of irregular exostoses growing from os suffraginis (ringbone). A similar pouch of synovial lining, but of smaller size, present in mid-line of posterior surface, lying between insertions of deep division of inferior sesamoidean ligament. A small single exostosis arose from the bone at the lower-most point of this pouch.

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Bi-Annual Inspection of Dairy Herds.

SCHEME FORMULATED BY GLOUCESTERSHIRE VETERINARY INSPECTORS AND THEIR COUNTY COUNCIL.

"At a meeting of the Gloucestershire County Council on Monday," says the *Gloucester Citizen* of April 12th, "a Minor Committee appointed by the Diseases of Animals Committee to discuss with representatives of the veterinary inspectors the question of the inspection of cattle under the Milk and Dairies Act and Order, and the remuneration to be paid therefor, reported that they had held three conferences with representatives of the veterinary inspectors on the subject. As the matter affected also the Public Health and Housing Committee, the Minor Committee invited representatives of that Committee to confer with them on the subject, and representatives of the Public Health and Housing Committee had accordingly attended the last two conferences with the veterinary inspectors.

"The Joint Committee thus formed fully discussed the matter and decided to recommend as follows:—(1) That the veterinary inspectors under the Diseases of Animals Acts be appointed also as veterinary inspectors for the purposes of the Milk and Dairies Act and Order; (2) That the County Medical Officer of Health be authorised to instruct the veterinary inspectors to make such inspections as he may consider necessary for the purposes of the Milk and Dairies Act and Order, subject to reports thereon being made to the Diseases of Animals Sub-Committee; (3) That the County Council be asked to delegate to the Diseases of Animals Sub-Committee all the powers of the Council under the Milk and Dairies Act and Order, and that the Public Health and Housing Committee be invited to nominate three members of that Committee to attend meetings of the Diseases of Animals Sub-Committee when any matters arising under the Tuberculosis Order, or the Milk and Dairies Act and Order, are considered.

"It was considered very desirable, if possible, to arrange to pay the veterinary inspectors a comprehensive fee to cover all services under the Tuberculosis Order, and the Milk and Dairies Act and Order, and as a result of the Conferences with the representatives of the veterinary inspectors it had been provisionally agreed with the veterinary inspectors as follows:—To pay the veterinary inspectors a fixed capitation fee, for which they shall carry out the following duties, namely: (1) All services under the Tuberculosis Order, 1925; (2) Examination of all milking herds twice yearly, this to include cows in milk, dry cows in calf, and in-calf heifers; reports to be given upon such examinations stating all animals suffering from any disease mentioned in the Milk and Dairies (Consolidation) Act, 1915, and Milk and Dairies Order, 1926; (3) All services under the Milk and Dairies (Consolidation) Act, 1915, and Milk and Dairies Order, 1926, so far as they relate to tuberculosis; (4) All travelling expenses in the above services.

"The capitation fee to be the sum of one shilling per head, calculating for this purpose—all cows in milk, all dry cows, and all heifers in calf. It was proposed that the arrangement should take effect as from April 1st, 1927; that, as far as possible a period of six months should intervene between the two inspections mentioned in Clause (2); and that payment should be made at the rate of 6d. per head for each of the specified animals examined during each period of six months.

"The Diseases of Animals Sub-Committee recommended that these proposals be adopted.

"Mr. L. C. Wrigley, in submitting the recommendation, said that the proposals, which were approved by the Diseases of Animals Sub-Committee on Saturday afternoon, after the Agricultural Committee had dispersed, were submitted directly to the County Council in order that there might be no delay. The Joint Sub-Committee were of opinion that the duties under the two Orders would be more efficiently administered under a comprehensive scheme. It was impossible to say how many cows were affected by tuberculosis, but it was estimated that the total cow

population of the county was 47,000 and at a capitation fee of a shilling the cost of inspection would be £2,350. As far as could be ascertained, the administration of the Tuberculosis Order last year cost £1,475. They had reduced the scale of travelling expenses, but by a fair estimate they would incur an expenditure of £1,250 in carrying out the Order as last year. Therefore the examination under the Milk and Dairies Order would cost them about £1,000 under the joint capitation arrangement. Hitherto the Veterinary Inspectors had examined only cases where tuberculosis was known or suspected, but under the new Order they would inspect every milking herd, and would possibly detect hitherto unsuspected cases of tuberculosis, and so save the county ultimately thousands of pounds. If the recommendations were passed the arrangement would come into operation as from April 1st, and the Veterinary Inspectors could get to work at once.

"Mr. R. G. Hanks took exception to the inclusion of in-calf heifers in the inspection. They were not included in the estimate of the cow population and were, therefore, an unknown liability; it was very difficult to define an in-calf heifer and, further, there was an enormous risk in any attempt to bring them into the stalls for examination. Moreover, a great many heifers were reared in Gloucestershire which never came into Gloucestershire dairy herds, whilst, conversely, the dairy herds took in heifers from other counties where possibly they were not inspected. He suggested that it would have been possible for the Committe to have made a satisfactory capitation arrangement with the veterinary inspectors without including the in-calf heifers.

"Mr. E. W. Walker supported Mr. Hanks, but the Sub-Committee were backed by Mr. J. P. Terry, Mr. Thomas Rich and Mr. C. E. Clarke. Mr. Terry said it was their duty to safeguard the owners of the dairy herds, who were liable to have their supplies, amounting possibly to thousands of gallons, rejected under the Order. Mr. Rich elicited from Mr. Wrigley that the inspection of in-calf heifers was restricted to those that were upon dairy farms—they had no intention of searching the hill country for heifers that did not come into these herds. The veterinary inspectors could not be satisfied unless they made a comprehensive examination of all the animals on the farms inspected. Mr. Hanks and Mr. Walker had conjured up a nightmare which did not exist in reality.

"The report was carried with one or two dissentients."

Infectious Diseases at Dairies.

A circular, dated April 13th, 1927, has been issued by the Scottish Board of Health, drawing the attention of local authorities to the provisions of the Milk and Dairies (Scotland) Act, 1914, which deal with infectious disease. The object of the circular is to point out that, in the prevention of tuberculosis and infectious disease due to infected milk, dairymen and their employees can give great assistance and are bound by law to do so. It is believed that if the provisions of this Act were carefully applied by the producers of milk and their employees, milk-borne tuberculosis and such infectious diseases as diarrhœa, dysentery, enteric fever, diphtheria, and scarlet fever would be almost entirely prevented. The circular complains that when a milk supply is suspected of causing disease, the attitude of the producer of milk and his employees is too often one of indifference or of actual obstruction, and it alleges that during 1926 several outbreaks of infectious disease were spread by milkers who, themselves infected, continued to milk cows. In one instance about 150 persons became affected by dysentery through a milker breaking the law by continuing to work while suffering from this disease, while in an outbreak of scarlet fever over 150 cases were traced to a milkmaid who continued to milk cows while suffering from a mild attack of the disease. In both essential facts had been withheld from the medical officer of health. The circular advises that certain provisions should be strictly enforced by the local authorities in the public interests. It is pointed out that a dairyman is required to report to the medical officer of health symptoms of infectious disease occurring in any person resident or employed at the dairy or any person residing in the same house as an employee of the dairy. A dairyman is liable to a penalty if he allows any person to milk cows or to handle milk vessels while suffering from diarrhœa, sore throat, any suppurating sore, or any infectious disease, or if he allows any person to milk cows or handle milk vessels if that person has recently been in contact with a case of infectious disease. Notification is incumbent also on the dairyman if he has in his dairy any cow suffering from a sore on the teats, accompanied by suppuration or bleeding, or from any disease liable to contaminate milk, or any cow giving tuberculous milk. Attention is also drawn to a by-law to the effect that the hands and forearms of milkers and of any persons engaged in handling milk or milk vessels are to be thoroughly washed and to be dried on a clean towel before work is begun. Medical officers of health are advised to take the family doctor along with them in cases where the physical examination of any patient is necessary, and where cases of disease have occurred and there is reason to believe that the origin of the disease is a milk supply. Medical officers of health should also take particular care to control the movements of those who are in attendance on a case of infectious disease at a dairy and to investigate the houses of persons employed in the dairy and examine inmates of such households. Where infectious disease occurs in families supplied with milk by one dairy and where the medical officer of health is reasonably satisfied that the infection is carried by that milk supply, even although after a visit to the dairy the actual source of the outbreak is doubtful, the medical officer of health should make an interim order, but the local authority can make an immediate order stopping the milk supply. A possible alternative for the farmer as an emergency measure is a complete change of milkers and all those who handle milk, together with thorough washing of the cows' udders and disinfection of all utensils and apparatus concerned. The Board of Health suggests that in any case where information has been withheld wilfully the dairyman or the employee or both shall be proceeded against. The local authority is liable to pay to a dairyman full compensation for any loss arising out of the order stopping the milk supply if the damage has not arisen by reason of the dairyman's default, but it is pointed out that this should not deter the local authority from making such an order when stoppage of the milk supply is recommended by the medical officer of health, because inaction of this kind may be false economy.—*British Medical Journal.*

Irish Medical Register.

"Under the terms of the new Medical Registration Bill, which has been introduced into the Free State Parliament, a separate Medical Council and Register will be established in the Free State. The new Council will have nine members, representing Dublin University, the three constituent colleges of the National University of Ireland, the Colleges of Surgeons and Physicians conjointly, and the Apothecaries' Hall, with two additional members nominated by the doctors themselves, and one Government nominee.

"Under the new arrangement every doctor practising in the Free State will be required to enrol himself on the local register, but by virtue of a reciprocal agreement with the General Medical Council every doctor whose name appears on the General Register will be eligible to practise in the Free State on payment of a fee. Conversely, every Free State doctor will be allowed to enrol himself on the General Medical Register.

"The new system provides for direct representation for both the Free State and Northern Ireland on the General Medical Council."—*The Times.*

The Veterinary Record.

14th May, 1927.

EQUINE CHRONIC ARTHRITIS.

The paper by Dr. Tom Hare on the subject of Equine Chronic Arthritis which is concluded in the current issue of our journal, is not the less valuable in that it confirms by a process of elimination most of the views on the pathology of this group of diseases generally held by veterinarians who have closely considered the subject.

It is hoped that all our readers will study this distinguished contribution by Dr. Hare to veterinary literature; it is the most painstaking and the most exhaustive work on the subject which it has ever been our privilege to publish.

For those who lack the time to follow Dr. Hare step by step in the account of his researches, it may be said briefly that the author contends that the structural deformities in chronic arthritic joints (recognised clinically in the spavined hock, the articular ringbone, &c.), *i.e.*, osteo-arthritis, are the end result of a pathological process having a diverse etiology. For instance, an osteo-arthritic hock or hocks may be due primarily to any one of the following factors—(1) bacterial infections—*e.g.*, strangles, influenza, tuberculosis; (2) metabolic poisons—*e.g.*, gout, rickets; (3) local trauma—*e.g.*, fractures into the joint; (4) neoplasms; (5) senility; (6) diseases of the nervous system; and (7) a blood-borne agent which, while it remains undetermined, Dr. Hare prefers to regard as an entity analogous to the rheumatoid arthritis of man.

But, as Dr. Hare argues, however manifold and diverse these primary etiological factors may be, their first objective is the destruction of one or more of the joint tissues (the "pathogenic phase"). Once these tissues have suffered damage, overgrowth or absorption of tissue follows, leading to alterations in the mechanism of the affected limb which in turn produce still more widespread damage to the affected joint structures (the "secondary phase" or osteo-arthritis). Thus, for instance, altered stresses from defective shoeing, concussion from artificial roads, carry on as it were the crippling injury initiated by one or more of the author's group of primary causes: in other words, mechanical factors are in the main secondary and can only be considered as primary causes when they produce direct trauma (*e.g.*, fracture) to the joint structures.

It may be a little difficult for a clinical worker to endorse, at first sight and completely, Dr. Hare's views as to the relative importance of the mechanical factor, because the observations of a professional life-time will have taught him always to expect the greatest incidence of equine chronic arthritis in horses doing fast or strenuous work on hard ground and the least in horses doing slow or steady work on soft ground. Between these two extremes such variations in incidence of chronic arthritis as occur—*e.g.*, spavin in hunters and ring-bone in coal-cart horses and city vanners—*seem* to be attributable primarily, in most instances, to excessive stress—to mechanical causes. With this experience in his mind, the clinical worker might not unreasonably assume that, in proportion as the work of the horse, by reason of artificial roads and consequent frequent and heavy shoeing, has become progressively more mechanised, so the animal has become more subject to diseases of primarily mechanical origin. This difference from Dr. Hare's conclusions, however, is one which may be resolved by the further enquiries which we understand he intends to make into this group of diseases.

It is not given to many of us to have the capacity for taking pains and the opportunities of Dr. Hare in research work, but it is for those of us whose work is chiefly clinical to see that we do not lag behind in our practical application of the principles so carefully stated. If we accept these principles as correct we are bound to admit, for example, that any therapeutics, to be at all useful, must be applied in the early stages, before there has been any substantial structural modification of the bone and articular cartilage.

As in many other respects, our chief value to the community in this connection, too, lies in discovering, if possible, the means of prevention, and in so far as there may be an hereditary predisposition to certain forms of chronic arthritis, much may be done by the avoidance of unsound mares. It may be assumed that too many of the mares which retire from towns to farms on account of chronic arthritis become the mothers of potentially unsound foals; mares which remain sound in urban work never retire to the country for breeding purposes.

CLINICAL AND CASE REPORTS.

Ivy Berry Poisoning.

By W. L. RICHARDSON, M.R.C.V.S., Wadebridge.

On March 4th last I attended a fifteen months' old Devon steer exhibiting the following symptoms:—Salivation, sunken eyes, dilated pupils, unsteady gait, quick, weak pulse; temperature 104° F.; acute diarrhœa. I found in the fæces a very great number of seeds of the ivy berry. I examined the pasture and found several ivy bushes completely stripped of the berries. On March 16th last, I attended a cow showing exactly the same symptoms as the steer, only she was very tympanitic and the action of the heart was very tumultuous. In this case I found several ivy bushes stripped of berries.

Both these animals recovered within a week and were treated with stimulants and laxatives. I have recorded these cases because the literature on the subject appears to be rather scanty.

Feline Diseases.

By Major W. HAMILTON KIRK, M.R.C.V.S., Wigmore St., W.

In the issue of the *Veterinary Record* for April 2nd appeared a clinical article under the authorship of Prof. D. Smythe. He wrote:—"Amongst our feline patients we are periodically meeting with cases which are epidemic and undoubtedly contagious, but which have received very cursory attention in veterinary literature. These cases, from their clinical symptoms, fall into three main types."

He then described the *First Type* as a "form of contagious gastro-enteritis" and disagreed with those practitioners who diagnose the condition as feline distemper. The train of symptoms and the *post-mortem* findings, as detailed by Prof. Smythe, are precisely similar to those found on pages 174 and 175 of my work entitled "Diseases of the Cat," which was published in 1925. In this book I described the disease in question as "infectious enteritis"—a very definite and well-known malady of the cat. Some authorities have called the condition "croupous enteritis"; others "feline typhus"; "epizoötic enteritis," the cat malady or cat plague.

Second Type. The second condition mentioned by Prof. Smythe is one which he calls "a form of contagious stomatitis," although he does not mention whether such cases as he has encountered were or had been also the subjects of enteritis. I might point out that acute cases of infectious enteritis are usually fatal, but that in instances of more chronic attacks the mouth lesions often set in, and recovery is then rather more frequent. On the other hand, the "pharyngeal type of feline distemper" has much in common with the symptoms as described by Prof. Smythe, for we find the tongue and cheeks studded with vesicles which, sooner or later, rupture, leaving ulcerated surfaces in their stead. The gums are sometimes ulcerated and very sore, whilst the mucous membrane of the pharynx is congested and swollen. In some cases, at a later stage, the throat may be covered with a thick diphtheritic deposit rendering cough frequent and swallowing difficult. Such a complication renders the case very grave, for the mortality from this form of distemper is usually high. Depression and emaciation are marked, fœtid discharges emanate from the nose and eyes, bronchitis often sets in, followed shortly by prostration and death. The differential diagnosis in such an illness seems to be that in the first case there is enteritis complicated by stomatitis, and that in the second case there is a primary stomatitis complicated by bronchitis, and ocular and nasal discharges. In all cases of stomatitis in the cat, whether simple or infectious, the great difficulty lies always in the feeding of the animal, and any therapeutic measure may well be defeated if inanition is allowed to ensue.

The *Third Type* of feline disease as described by Prof. Smythe appears undoubtedly to be the form of distemper which is by far the most commonly seen in the cat, namely, the catarrhal form. It is also the most benign—at least in my experience. So far as the term "influenza" is concerned, I know of nothing which distinguishes this condition from distemper, and in my book I have classed the two diseases as one. We do know the train of symptoms to be expected in a case of distemper, but I am not aware that any syndrome has as yet been laid down, in the dog or cat, as especially pertaining to influenza. I doubt, in fact, whether there is such a disease of these animals.

The whole question of definite diagnosis of nearly-allied diseases is of course extremely difficult, and it will not become much easier until specific causal organisms can be isolated. Meanwhile, diagnosis can only be facilitated by the adoption of a list of the most typical symptoms encountered in each disease, and deciding the issue more or less according to whether these are present or absent.

I am bound to admit that it was Prof. Smythe's allusion to the paucity of literature upon the cat which led me to draw his attention to my own work upon the subject, which is the *only* one in the English language. A small French work was published a few months ago and was reviewed in the *Veterinary Journal* of December, 1926.

A Peculiar Case of Tuberculosis in a Cow.*

By G. A. MOORE, Dublin Veterinary College.

We were called out to see a cow which, according to the owner, had not been thriving and which used to "swell up" after feeding. On making a very careful examination, we found nothing beyond this intermittent tympany and evidence of pain just behind the sternum on the abdominal floor. We came to the conclusion that the animal was suffering from either:—(*a*) Some form of rumenitis associated with the presence of some irritant—probably a foreign body—in the rumen; or (*b*) tuberculosis of the abdomen.

On making enquiries of the owner, we were informed that the cow had rather a morbid appetite and was very fond of tit-bits in the shape of the week's washing, old bags, etc., so she was treated for (*a*) but without result. A few weeks later she as had become very emaciated she was reported to the local authorities. The cow was slaughtered.

* Case included in series presented for award under the N.V.M.A. Clinical Prize Scheme for Students.

A *post-mortem* examination revealed the presence of grape lesions on the anterior surface of the rumen covering an area of about one square foot. The lesions were small—not quite the size of hazel nuts. In the spleen were found numerous tubercles about the size of walnuts, containing thick caseous material. There were also some grape lesions in connection with the capsule of the spleen. On the diaphragmatic pleura there were also the beginnings of grape lesions. Scattered here and there were numerous small areas of thickened pleura. These were of a reddish colour and looked like tiny raised ulcers. There were similar lesions on the opposing pleura covering the lung. There were no other tuberculous lesions.

This case led me to renew my acquaintance—or rather make the acquaintance—of the lymphatic system of the area affected with the lesions and to try to form some tenable theory as to the method of infection. My theory is as follows:—

The wall of the rumen became slightly inflamed and its resistance lessened by some of the tit-bits the animal was fond of eating; thus the tubercle bacilli gained entrance to the lymphatic spaces of the wall of the rumen and proceeded along the lymphatic spaces to the spleen, where they set up lesions. These I regard as the primary lesions. The point of entry of the bacilli into the wall of the rumen I consider was about opposite the point of attachment of the spleen. From the spleen the bacilli were carried along the lymphatic vessels in a centrifugal direction to the peritoneum. From the peritoneum they proceeded through the tendinous centre of the diaphragm to the pleura. The strange thing is that there were not more grape lesions in the peritoneum. Also, one would expect a generalised infection owing to the peculiar blood-vascular system of the spleen. It is also peculiar that the splenic lymph glands were not affected.

Fatal Colic in Small Pony.*

By A. J. Kennedy, Edinburgh Veterinary College.

History. A Dartmoor pony gelding, twenty-four years' old, but a hardy and useful animal in spite of his age, had been taken from grass and yoked into a small fire engine during an emergency. He was returned to the stable hot and tired; some time afterwards he broke loose, and got at some cattle cake and meal, and, when discovered two hours afterwards, was showing uneasiness and dull, continuous pain.

Symptoms. Dulness, anxious look in the eyes, dyspnœa, pulse frequent and weak, cold extremities, temperature 101° F. Conjunctiva seemed normal. The heart was sound on routine physical examination.

Thorough examination of the alimentary system was carried out. Mouth and tongue were white and pasty, with a sickening odour. Palpation and percussion of the flanks showed nothing abnormal. Auscultation revealed an occasional tinkling sound in place of ordinary peristalsis. Rectal exploration discovered the pelvic flexure distended and solid with ingesta. On passing the stomach tube resistance was felt about the entrance to the stomach, and it was withdrawn covered with foul-smelling, fermenting ingesta.

Diagnosis. Impaction of the stomach, with commencing impaction of the double colon, caused by unsuitable food and tired condition.

Treatment. Per stomach tube, ammon. carb. ℥j, pulv. nucis vom. ℥ss, and ol. terebinth. were given. Injection of eserine and pilocarpine. External counter irritants over back and loins, and clothing the patient.

Prognosis. From the extent of the systemic disturbance and horse's age, recovery unlikely.

Second Day, 11 a.m. *Symptoms.*—Great dulness, marked dyspnœa. Pulse small, weak and thready. Warm extremities. Temperature 104° F. Eye and mucous membranes injected a deep, livid red. Dull pain had been present all night. Alimentary system: foul smelling fæces of firm consistence had been passed in quantity. On rectal exploration, large colon slightly distended. Occasional gurgle from the intestines.

Treatment. Strychnine hypodermically.

Second Day, 6 p.m. *Symptoms.*—Pony looking much worse, the eye having a sunken, distressed look. Pulse very weak and frequent. Temperature 104° F. Mucous membranes, a dull, livid red. Hind quarters pressed against the wall, staggering and collapse when moved. Owing to the graveness of the general symptoms the animal was shot.

Post-mortem Examination. Stomach full of pasty, half-digested cake and meal. Acute inflammation of stomach, less acute of large colon, and small bowels.

When first seen, the animal was probably suffering from the physical discomforts of fatigue and an impacted stomach. The normal eye seemed to indicate absence of inflammation in the viscera. But age and over-exertion had lowered the resistance, and by next morning there was evidence of acute inflammation.

* Case included in series contributed for award under the N.V.M.A. Clinical Prize Scheme for Students.

ABSTRACTS.

Treatment of Demodectic Canine Mange by Ultra-Violet Photo-therapy.

(Dr. P. Pierron, *Thesis for the Doctorate in Veterinary Science*, Lyons, 1926.)

The author reports the results of experiments carried on during three years in Professor Marotel's laboratory. Having recalled the utilisation and benefits of natural heliotherapy, he notes that the therapeutic, bactericidal and sclerogenic properties of solar light are probably due to the ultra-violet radiations, the action of which is already experimentally demonstrated.

Researches undertaken on the treatment of follicular mange in the dog show the efficacity of photo-therapy. The important results obtained are summed up in the following conclusions:—

"Demodectic canine mange—a disease most frequently incurable when it is extensive, can be cured by ultra-violet photo-therapy.

"One of the best methods consists in using a quartz lamp with mercury vapour, such as the Lumière-Gallois lamp. The treatment requires usually 4 or 5 insolations

of 50 to 60 minutes, at 20 centimetres distance, for each lateral half of the body ; as the sittings are daily, their total duration is then about 10 days. To facilitate the penetration of the rays into the skin, the skin should be first shaved and cleared of its crusts (by warm washing with soap followed, if possible, by lotions of alcohol-ether, dissolving the sebum). If the case is one of pustular demodexosis, the pustules should be pierced before each sitting, so as to bring out the pus, and exteriorise its parasites (Demodex, Staphylococci) ; these, having been rendered more superficial, become in consequence more sensitive to the rays.

" The eyes, which are in danger of being burned by the lamp, should be covered by a bandage soaked in water, which is sufficient to stop the radiations. The head must be treated by one of the other methods at present in use : (puncture with sterilisation of the pustules ; frictions with a liniment of alcohol-ether-benzine).

" The light-bath has the advantage of certainly touching the whole skin, not omitting any diseased part ; of being easy to apply and of absolute curative value ; unfortunately, it is a little costly, so that its use must be reserved for valuable dogs.

" It is certain that ultra-violet photo-therapy puts canine medicine henceforth in possession of a weapon superior to any other for the treatment of follicular mange."

[Ex *Revue Générale de Médecine Vétérinaire*, March, 1927].

R. L. HIGGINS.

The Search for Coccidia in Domestic Animals by the aid of Concentrated Solutions of Sodium Chloride.

(OTTEN in *Deutsche tierärztliche Wochenschrift*, 10th APRIL, 1926.)

The method with sodium chloride constitutes a simple and practical means of demonstrating coccidia in birds and mammals.

Otten found the following percentages : 91 per cent. of goats, 69 per cent. of sheep and 65 per cent. of pigs show coccidia in their fæces. Coccidiosis is met not only in young pigs, but notably in old pigs which infect the young pigs.

Coccidia are present in 54 per cent. of young cattle and in 22 per cent. of bovines more than three years old.

[Ex *Revue Générale de Médecine Vétérinaire*, March, 1927].

R. L. HIGGINS.

H.M. STATIONERY OFFICE PUBLICATIONS.

The undermentioned have been published during the week. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at the following addresses :—London : Adastral House, Kingsway, W.C.2, and 28 Abingdon Street, S.W.1 ; Cardiff : 1 St. Andrew's Crescent ; Manchester : York Street ; Edinburgh : 120 George Street.

	Price Net	Post Free
HOUSE OF COMMONS REPORTS AND PAPERS, 1927.		
56. Diseases of Animals (Re-committed) Bill (Lords). Report from Standing Committee B, with the Proceedings of the Committee	s. d. 0 1	s. d. 0 1½
MEDICAL RESEARCH COUNCIL.		
Spirochætal Jaundice. Special Report Series No. 113	4 0	4 2

DIVISIONAL REPORTS.

North of England Division.

ANNUAL MEETING AT NEWCASTLE-ON-TYNE.

(*Continued from page* 428.)

The Annual Meeting followed the luncheon, the President Mr. T. Wilkinson, being in the Chair. The attendance book was signed by the following : Messrs. H. Hicks, C. G. Hill, H. Peele, J. W. Rider, T. M. Mitchell, C. Elphick, W. Lyle Stewart, T. Parker, J. Davidson, J. P. Isherwood, F. Christopher, F. Pickering, J. H. Taylor, W. H. Blackburn, C. Nicholson, D. Starkey, H. S. Elphick, A. Scott, N. Irvin, G. Thompson, W. A. Doughty and J. R. Rider, *Hon. Secretary*.

Visitors.—Professor G. H. Wooldridge, President N.V.M.A. ; Dr. O. Charnock Bradley, Messrs. W. Jackson Young, H. L. Hobson, and K. Ollerhead.

Apologies for absence were received from Messrs. G. M. Mitchell, W. Summers, both of whom were unable to attend on account of illness, A. D. Sanderson, B. Hoadley, F. T. G. Hobday, H. J. Dawes, A. C. Forbes and W. B. Towell.

The minutes of the previous meeting, having been published, were taken as read and were approved.

CORRESPONDENCE.

(1) A letter from the General Secretary N.V.M.A., enclosing a copy of Sir John Moore's report on the Jubilee Congress of the Royal Sanitary Institute, and calling attention to the proposed change in title of the section of the Congress dealing with veterinary public health matters.

The President of the " National " informed the meeting that the Royal Sanitary Institute had already considered the proposed change and was likely to conform to the desires of the N.V.M.A. If was therefore unnecessary for that Division to take any action. The meeting endorsed the opinion expressed in Sir John Moore's report and was gratified to learn that the Royal Sanitary Institute had given sympathetic consideration to the matter.

(2) A letter from the General Secretary, N.V.M.A., respecting the control of cows re-acting to the Tuberculin Test, asking for replies to the questions :—

(a) Whether the time has arrived for exercising some form of control over cows that have reacted to the Tuberculin Test.

(b) If so, what form that control should take and how far it is practicable at the present time

Professor WOOLDRIDGE pointed out that these questions, which had been sent round to all Divisions, had arisen out of a resolution from the North of England Division. No action need be taken by the Division, unless its members desired to reconsider the question.

The SECRETARY read the recommendations of the Council on the matter, namely, that the replies to the two questions be given as follows :—

(A) In the affirmative.

(B) That representations be made to the Ministry of Health or Agriculture, as the case may be, to secure

(a) The marking of reactors in such a manner as to enable them to be identified.

(b) The control of the sale of Tuberculin.

Professor WOOLDRIDGE said that the question of the controlling of tuberculin was receiving the close attention of the Council of the " National " Association.

Mr. C. ELPHICK, as the prime mover of these resolutions, urged that the questions be well supported by the Council of the " National," and that the decision of the Council be loyally observed.

(3) A letter was received from the Lord Mayor of Newcastle with regard to the guarantee fund for the North-East Coast Exhibition to be held in Newcastle in 1929.

It was agreed that the sum of twenty guineas be guaranteed.

Nominations.—Mr. Colin Welsh was nominated for membership by the SECRETARY, seconded by Mr. MITCHELL.

SECRETARY'S REPORT AND FINANCIAL STATEMENT.

Major PEELE moved the reception and adoption of the report, remarking that he thought it could be considered very satisfactory. He called attention to the recommendation of the Council that the subscription be increased to £1 1s., saying that the cost of representation on the Council of the "National" loomed large in the expenditure. If this item were to be curtailed it really meant dropping out of the "National."

Mr. H. S. ELPHICK, in seconding, said that the benefits which accrued from representation on the "National" were well worth the cost.

Considerable discussion on this item in the report ensued, and it was finally agreed that the subscription be raised to £1 1s., and that the entrance fee previously charged to new members be remitted in the future, the change to become operative for the current year.

Thereupon the report was adopted unanimously.

The PRESIDENT then welcomed his successor to the Chair, wishing him a successful year of office.

Mr. J. W. RIDER took the Chair at this stage, amidst the applause of the meeting.

PRESIDENTIAL ADDRESS.

The NEW PRESIDENT, Mr. J. W. Rider, then delivered his Address from the Chair as follows:—

Gentlemen,—I thank you for the honour you have done me in electing me your President for the ensuing year. I do not agree that you have made the most suitable choice for this office, but since you have made your choice, and in so doing have imposed certain duties on me, it will be my endeavour to carry out these duties to the best of my ability, and to further the interests of this Division of the "National" in every possible manner.

It is a great pleasure to see this old Division taking on a new lease of life, which I hope will grow gradually stronger. During recent years much very interesting matter has been placed before the members, but I should like to see still better attendances at our meetings. I feel sure that we are all able to learn something from the proceedings, and there can be no better reward to the officers of the Division than to be greeted by a large gathering of members.

As you are all aware, a very kind invitation has been sent by the Lord Mayor of this city to our parent body the "National," to hold its Congress in 1928 in Newcastle. One must also mention the kindness of the Principal of Armstrong College in offering the use of the College buildings for this Congress, which, so far as one can judge at the moment, seems likely to receive the approval of the annual meeting of the "National."

Assuming that the invitation will be accepted, it will mean a considerable increase in the normal work of this North of England Division, and I wish to make a special appeal to all our members to offer their loyal support to their officers in the task of arranging the Congress programme. Briefly, the Provisional Committee of the "National," which is charged with this work, would absorb practically all our active members, and I do therefore ask you one and all to use your best efforts to induce those who do not make a habit of regularly attending meetings to reconsider their position, and rally to the assistance of this old Division. There is no reason why Newcastle should not be one of the best of the "National" gatherings, but I want to emphasise the fact that this can only be the case if all our local members pull together towards the desired goal.

In passing, I should like to point out that members of the Provisional Committee must of course be members of the "National." I hope there are few of our members who are not also members of the parent body, and to them I would say: "Do join without further delay, the Secretary has a number of application forms one of which he will supply to anyone who cares to ask for it." The privileges of membership are many, not least being the pleasure of meeting old friends at the annual meetings, while in a moral sense one has the satisfaction of knowing that one is assisting the "National" in all its efforts on behalf of the profession as a whole.

Cruelty to Animals.—For many years it has been my lot to attend to underground stock, and from my experience I can safely say that in all well-managed establishments every care and attention is lavished on the animals. From time to time considerable comment as to the care of pit ponies is published in the press. So far as my own experience is concerned, I must say that the statements made are much exaggerated. As on the surface, cases of wilful cruelty do occur, and whenever evidence can be obtained (often a most difficult task) no hesitation is made in bringing the offender to justice. Unfortunately, the punishment meted out in some instances is totally inadequate for the seriousness of the crime and I hope the time is not far distant when some more severe form of punishment will be administered.

A word about old and decrepit animals. When an animal has given of its best, and is of no further service, that animal should be destroyed, and not sold for a mere trifle to end its days in a hawker's cart. This provision, in my opinion, should be made compulsory.

Government inspectors, who are laymen, are appointed to inspect the underground stock periodically, undoubtedly with beneficial results, but I should like to see a member of our own profession at the head of this department.

Other cases of wilful cruelty should be dealt with in no half-hearted manner—such cases, for example, as keeping dogs continually on the chain, turning dogs adrift when the licence becomes due, or turning cats adrift during the owner's absence on holiday.

Royal Veterinary College Building Fund.—There will be no need for me to impress the needs of their *Alma Mater* on those graduates of Camden Town, and there are two reasons why I would commend to graduates of other Colleges the appeal recently issued by Sir John M'Fadyean.

First, there is the provision of new buildings. As these are a necessary adjunct to the better training of future members of that profession to which we have the honour to belong, their provision should be the concern of all members of the veterinary profession. It should be remembered that the Government, on this occasion, has offered to give a grant on a pound for pound basis.

Secondly, to graduates of the Royal Dick College, I would say, "Graduates of London and other Colleges willingly helped you to commemorate the Centenary of your founder; now, therefore, 'Go thou and do likewise' for the assistance of Camden Town." (Applause).

At the conclusion of his address, the President said that he felt the thanks of the Association were due to his predecessor for the very able manner in which he had filled the Chair during his year of office. He accordingly moved that a very hearty vote of thanks be accorded to the past President. This was received with applause by the meeting and Mr. WILKINSON made a fitting response.

ANY OTHER BUSINESS.

Mr. JACKSON YOUNG mentioned that his colleague, Mr. Powley, had been nominated for election to the Council of the Royal College of Veterinary Surgeons, and he asked members in the North of England to support his candidature.

Dr. BRADLEY said that it was to be regretted that Mr. Jackson's duties as Chief Veterinary Officer rendered it impossible for him to seek election to the Council. It was his firm opinion that the veterinary staff of the Ministry of Agriculture should be represented on the Council, if possible by its chief officer, but if that course was impracticable then by another member of the staff. He warmly commended Mr. Powley's ability to represent his colleagues.

Professor WOOLDRIDGE also spoke in support of Mr. Powley's nomination, and the meeting agreed to support him at the forthcoming election.

A discussion followed on recent local activities of the People's Dispensary for Sick Animals of the Poor.

Hearty votes of thanks to the authorities of Armstrong College for their courtesy in permitting the use of rooms, and to the President for his conduct in the Chair terminated a most successful meeting.

J. R. RIDER,
Hon. Secretary.

Lancashire Division.*

MEETING AT MANCHESTER.

A General Meeting of the Lancashire Division was held at the Grand Hotel, Aytoun Street, Manchester, on February 2nd, 1927, at 3-30 p.m. The Chair was taken by the President (Mr. John Holroyd), and other members present were: Messrs. J. H. Wright, R. P. Holmes, J. O. Powley, E. H. Curbishley, A. W. Noel Pillers, P. J. Lindsay, O. A. Ducksbury, J. Urmson, F. S. Warburton, E. F. Wood, H. H. Aldred, H. T. Matthews, F. A. Ball, R. C. Locke, F. F. Dixon, W. Woods, R. H. Oddy, A. J. Caldwell, J. W. Brittlebank, F. G. Edwards, H. H. Lord, F. H. Leech, H. G. Hewetson, J. Spruell, and Dr. Tom Hare.

Visitors.—Messrs. A. Leslie, W. R. McKinna, C. R. Chadwick, and O. Stinson.

Apologies for unavoidable absence were received from Messrs. Warwicke Fowle, J. H. Carter, R. Hughes, J. W. Proctor and H. L. Torrance.

The minutes of the last meeting were taken as read and were approved.

The Secretary read a letter from the Secretary of the National Veterinary Medical Association, with regard to representations being made to the Royal Sanitary Institute that the Section of their Congress which now goes by the name of "Veterinary Inspectors' Section" should in future be called the "Section of Veterinary Preventive Medicine."

The Secretary also read another letter from the same source, asking for the opinion of this Division with regard to the control over cows that have reacted to the Tuberculin Test, and the form of such control.

It was agreed to refer this letter to the Council before any action was taken.

Nomination.—Mr. J. E. Edwards, of Ambleside, was nominated for membership of the Division.

Elections.—The following were elected new members of the Division: Messrs. A. C. Shuttleworth (Lytham), James Holt (Leigh), Norman Brear (Ulverston), R. E. Hoile (Wrightington), J. D. Rankin (Colne), Peter Manuel (Crewe), F. H. Leech (Crewe), George Boulton (Sandbach), Robert Shepherd (Middlewich), J. J. Collins (Bowdon), T. O. Richardson (Tarporley), John Norbury (Knutsford), Thomas Walker (Blackpool), H. Holroyd (Blackburn), John Barker (Belson), James Mackintosh (Manchester), William Tweed (Sheffield), and George Hutchinson (Poulton-le-Fylde).

The PRESIDENT then called on Mr. O. STINSON, M.R.C.V.S., Appleby, to read his paper on "Some Common Diseases of Cattle."

[Mr. Stinson's paper, and the discussion which followed, will appear in an early issue.—Ed.].

At the conclusion of the discussion, Mr. WOODS said Mr. Stinson could not be allowed to go without a vote of thanks for coming that afternoon and presenting what might be termed a "surprise" paper. He hoped Mr. Stinson had been satisfied with the discussion, and that he had spent a pleasant afternoon.

Mr. ACKROYD seconded the proposal, which was carried unanimously.

JOHN SPRUELL,
Hon. Secretary.

* Received on 21st March, 1927.

MEETING AT LIVERPOOL.†

A General Meeting of the members of this Division was held at the Medical School, in the University of Liverpool, on Wednesday, April 13th, 1927, the President, Major J. H. Wright, O.B.E., being in the Chair. There was a large attendance, which included Professor S. H. Gaiger, Messrs. J. Spruell (Hon. Secretary), A. W. Noel Pillers (Hon. Treasurer), G. H. Locke, R. C. Locke, W. Woods, P. T. Lindsay, H. T. Matthews, L. A. Watson, F. A. Ball, J. O. Powley, A. G. Shuttleworth, F. S. Warburton, E. L. Butters, J. H. Hagan, F. H. Leech, J. Wilson, W. L. Cockburn, W. Kendrick, G. Mayall, G. C. Lancaster, A. J. Caldwell, J. H. White, W. Fowle, K. D. Downham, J. Holroyd, H. L. Torrance, W. Tweed, W. Fowle, and Dr. T. Hare.

Visitors.—Messrs. D. Lloyd Jones, F. W. Priestley, and Dr. Priestley.

The minutes of the last General Meeting were read and confirmed.

The Hon. Secretary announced receipt of letters apologising for absence from Messrs. E. F. Wood, J. Abson, P. Manuel, J. H. Carter, G. Boulton, R. Hughes and Colonel J. W. Brittlebank.

The Secretary reported that the Council, at a meeting on March 28th, had carefully considered the letter from the National V.M.A., on the question of the control of cows reacting to the Tuberculin Test, and decided to recommend the Division to adopt the following: "That while in sympathy with object, this Division does not think that any form of control of cows reacting to the Tuberculin Test is practicable at the present time."

The CHAIRMAN said they had heard the decision come to by the Council, and if the meeting agreed with it perhaps someone would move and second that the decision of the Council be endorsed.

Mr. W. WOODS said the object was thought to be a very good one, but the difficulty of carrying it out absolutely precluded further consideration of the matter. That was the opinion of the Council, and if anyone could work out a scheme that was practical that would be a different matter, but apparently no one could think of a scheme that would be practical.

On the proposition of Mr. J. O. POWLEY, seconded by Mr. J. HOLROYD, the decision of the Council of the Division was unanimously confirmed.

The PRESIDENT said that no doubt the members would have received, with notice convening that meeting, a circular with reference to the provision of a cup for the Manchester, Salford and District Horse Show Society, who had applied to that Division for a cup competition. The Council considered that the funds of the Division should not be used for this purpose, and it was thought that subscriptions could be solicited from individual members. He himself had already taken it upon his shoulders to push the matter forward, as the schedule for the Show had already gone out. If anyone would like to give a subscription, the maximum to be 10s., he would be very pleased to receive the money in order to buy a cup.

The HON. SECRETARY reminded the members that the next meeting of the Division would be at the Memorial Hall, Albert Square, Manchester, on May 19th next, when Professor R. G. Linton would lecture on the "Feeding of Dairy Cows," and to this meeting the local branches of the National Farmers' Union had been invited.

Election.—Mr. J. A. Edwards, O.B.E., M.R.C.V.S. (Ambleside), was unanimously elected a member of the Division on the proposition of the HON. SECRETARY, seconded by Mr. J. HOLROYD.

† Received on May 2nd, 1927.

The R.C.V.S. Council Election.

The Chairman said that, though the matter was not on the agenda, he was going to mention the fact that they had three members of their Association, Professor S. H. Gaiger, Mr. J. Holroyd and Mr. J. O. Powley, who were candidates for election. Professor Gaiger had done good work on the Council already and Mr. Holroyd and Mr. Powley had their names put forward for the Council for this year. He, as President of the Division, asked them to do their utmost to return these gentlemen so that they could be represented from a general point of view. They knew that what Mr. Holroyd did was always thorough, and he would see to the best interests of the Association and he could say the same of Mr. Powley.

Mr. J. Holroyd then read the following election address.

Mr. President and Gentlemen,—May I, in the first place, thank you and Colonel Brittlebank for nominating me as a candidate for the Council of the Royal College of Veterinary Surgeons. It is a source of satisfaction to know that one has the support of the President of the R.C.V.S. and the support of the President of such an important Division of the National Veterinary Medical Association as the Lancashire.

Although comparatively young to seek a seat on the Council, I make no apologies, because I feel that any of those who have the opportunities should express their opinions and offer their services for the benefit of the profession.

As most of you know, I am the son of a practising veterinary surgeon, and have been in close contact with, and taken a keen interest in, the veterinary profession all my life, and on this account I claim to have considerable knowledge of the interests of the profession in general, and the interests of the general practitioner and part-time inspector in particular.

Our " one portal " system of entry is fundamental to the success of the R.C.V.S., and must be guarded, if necessary, with all our power. Attempts have been made in the past, and may be made again, to upset this system, but I am firmly of opinion that our " one portal " system is right.

Our present four years' course I consider ought to be ample time to get through a veterinary curriculum, and rather than add another year I would suggest that such subjects as elementary chemistry and biology be relegated to the preliminary examinations and such parts of these subjects as are of a special veterinary nature could be added to existing subjects in other parts of the syllabus.

I strongly disapprove of any attempt being made to make the subject of stable management and horse shoeing subsidiary to hygiene, both of which are very important subjects for the veterinary student; in fact, I consider that hygiene is increasing in importance every year. If there has to be any alteration at all I would support any policy for increasing the efficiency of veterinary students in stable management, using the word in its broadest sense, to include cowshed, pig-sty and kennel.

The standard of the examinations must, as it is at present, be kept at a high level, and with the advancement in veterinary science, the syllabus must be amended from time to time, but we must always remember that we are primarily veterinary surgeons and that the membership diploma gives to the owner the authority to PRACTICE the art and science of veterinary medicine and surgery.

The question of compulsory pupilage is ever before us, and is a question which is full of difficulties. It was deplorable, but none the less true, to read in the *Record* a short time ago, an address by the President of the Yorkshire Division regarding the practical experience of many of the newly-qualified men. Why should the general practitioner be saddled with the trouble and responsibility of training students in practical work? Are not the colleges there for the purpose of teaching students the art and science of veterinary medicine and surgery? Do all the colleges supply the practical experience that it is a student's right to expect?

At the present time, I regard most seriously the activities of certain organisations, interested in the treatment of animal diseases, who do not employ members of our profession. By our training, by our Charters and our Acts, we of the veterinary profession are the persons specially fitted to treat animal diseases, and yet, springing up as if from nowhere, are others who claim to be specially trained for that work. The Royal College of Veterinary Surgeons must take active steps to safeguard our profession.

It has often been stated that the prosperity of the profession depends upon the success of the general practitioners, and that the general practitioners constitute three-quarters of the profession. There was never a time in the history of the R.C.V.S. when questions affecting the general practitioner were so much in evidence, and I ask you to see that the general practitioner, not only in Lancashire, but throughout the country, is well represented on the Council.

I should like to say a word to those members who do not return their voting papers. Whatever may be your principles, I do think it imperative that you exercise your right in recording votes at these annual elections. I do not know the average number of voting papers returned, but I gather that it is somewhere about one-third of those sent out. Do the other two-thirds take no interest in the management of the affairs of their profession, their daily toil? Is there not one of the candidates on the list worth a 1½d. stamp? Every man's ideas are not the same—it would not do if they were—but surely out of a dozen or more candidates you can find two or three with opinions that somewhere approach your own ideal. If there is a single man in the profession who can say he cannot vote for one candidate, then it is time that individual came forward and put up for the Council himself. I do ask for this to be a record election in so far as the number of voting papers returned is concerned.

In conclusion, Sir, I can only say that if I am honoured in being elected to the Council of the R.C.V.S. I shall always endeavour to do my duty there in the same way that I have tried to do it for the " Lancashire."

(To be continued)

Notanda.

" The two great events in the history of surgery," said Sir Humphry Rolleston, recently, " are the introduction, in 1846, of anæsthetics, which made surgery possible, and has been called ' the death of pain,' and the discovery of the antiseptic and aseptic method dating from 1867, which has made surgery safe for humanity and may in like manner be termed ' the death of infection.' "

. . . . . .

The vitamin content of cod liver oil varies over wide limits, depending to a great extent upon the condition of the fish from which the livers are taken, the manufacturing process and the storage conditions. (*Vety. Med.*).

. . . . . .

Crude cod liver oil, as used for cattle, is considered to have a richer vitamin content than the purified variety.

. . . . . .

Ultra-violet irradiation by artificial means has been found more reliable as a rickets-preventing agency than direct sunlight.

. . . . . .

An old treatment for warts that does not often fail is a saturated solution of sodium bichromate applied once a day. (*Nth. Amer. Vetn.*).

. . . . . .

A mixture of egg-yolk and cream will empty the gall bladder of animals. The action is regular and consistent according to Boyden's experiments. (*Anatomy Record*, vol. 24).

H. K.

NOTES AND NEWS.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

Sept. 12-17th.—N.V.M.A. Congress at Torquay.

May 16th—Meeting of the Editorial Committee, N.V.M.A., at 4-30 p.m.

May 18th—Meeting of the West of Scotland Division at Glasgow.

May 19th—Meeting of the Lancashire Division at at Manchester.

May 25th—Meeting of the Comparative Section of the Royal Society of Medicine, 1 Wimpole St., W.

Royal Veterinary College Rebuilding Fund.

Since the publication of the subscriptions to the Fund at the 31st March, 1927, the following donations have been received :—

	£	s.	d.
Bath and West and Southern Counties Society	210	0	0
Yorkshire Agricultural Society	200	0	0
Shire Horse Society	105	0	0
Mark Tailby, Esq., M.R.C.V.S., Birmingham	50	0	0
F. W. Dennis, Esq.	21	0	0
Red Poll Cattle Society	21	0	0
Mrs. M. J. Reid (Proceeds of Jumble Sale) ...	18	0	0
National Pony Society	15	15	0
The Farmers' Club	10	10	0
Channel Islands' Racing and Hunt Club ...	5	5	0
Gray Horseshoe-Pad Co., Ltd.	5	5	0

Our readers will be concerned to learn that Mr. J. McKinna, F.R.C.V.S., of Huddersfield, is lying seriously ill in a London nursing home. On receipt of this grave information the Editorial Committee of the N.V.M.A., at its meeting on Monday last, directed that a letter of sympathy be sent to Mr. McKinna, with earnest wishes for his speedy restoration to health.

In acknowledging the Committee's message, Mrs. McKinna states, our readers will be happy to learn, "I am glad to say my husband is making satisfactory, if somewhat slow, progress."

Royal Army Veterinary Corps Point-to-Point.

This annual event took place on April 23rd, at Liss, Hants., by kind permission of the Hambledon Hunt as the third event at their Point-to-Point steeplechase Meeting.

The course was practically the same as last year, although the jumps were stiffer. The going, nearly all grass, was in perfect condition. The weather was glorious and, as usual, attracted a large crowd of hunting folk, Officers and families from the neighbouring camps, farmers, and others of less respectable callings, one of whom relieved a senior officer of the Corps of his pocket case.

H.R.H. Prince Henry was a competitor in the first event, a race for Subalterns of his Regiment, the 10th Royal Hussars. He, like many others during the day, came to grief, fortunately without injury.

In the R.A.V.C. race, out of the fourteen entries on the Card, nine put up a very pleasing show in the paddock and faced the starter. They were :—

Major R. W. Mellard's Bay Gelding, "Big Ben," Rider, Capt. G. S. Walker.

Mr. A. G. Heveningham's Bay Gelding, "Whizz Bang," Rider, Owner.

Major E. G. Turner's Chesnut Gelding, "Express," Rider, Owner.

Lt.-Colonel W. H. Walker's Bay Mare, "Burncourt," Rider, Owner.

Major C. W. Townsend's Chestnut Gelding, "Travel On," Rider, Major C. H. S. Townsend.

Major R. A. Gooderidge's Chestnut Gelding, "Knobzon," Rider, Owner.

Mr. A. G. Ralston's Bay Mare, "Thrown Out," Rider, Owner.

Lieut.-Colonel J. J. Aitken's Bay Gelding, "Fuzee II.," Rider, Mr. A. Fowler.

Lieut.-Colonel J. J. Aitken's Bay Mare, "Sweet Violet," Rider, Owner.

The conditions of the race were :—Winner—Challenge Cup and a Cup presented by Mrs. E. C. Cottingham Bowes and 75 per cent. of Sweepstake ; second—25 per cent. of the Sweepstake ; for horses the property of or Government hired Chargers or hired troop horses since 1st March, 1927, of Officers of the R.A.V.C. (Regular or Territorial) on the active or retired list, which have been regularly and fairly hunted during the season 1926-27 with a recognised pack of Hounds. No horse is qualified to run which has ever won a race of any description (point-to-point and bona-fide hunt races excepted). Weight 13 stone or over. To be ridden by officers qualified to enter.

Travel On, a previous winner this year, was a strong favourite, Sweet Violet, Big Ben and Burncourt were also well supported.

Burncourt and Thrown Out came to grief early in the race, Whizz-Bang led, pulling hard for about a mile and a half, when he ran out and subsequently fell ; Travel On then took up the running, was never challenged again, and won easily, Express being second. Last year's winner, Sweet Violet, after falling, finished a good third.

The victory of the popular Secretary to the R.A.V.C. Point-to-Point Association on his brother's horse was a reward for his energy and successful arrangements for the afternoon, and the good sport he has shown this last winter as Master of the Aldershot Command Drag Hounds.

This year the race was thrown open to past Officers of the Corps and Territorial Officers of the Royal Army Veterinary Corps., with the result that Major C. W. Townsend of the Territorial Force, who provided the winner, Captain G. S. Walker, late R.A.V.C. and Lieut. A. Fowler, Territorial Force rode in the race.

It is hoped that more will follow in their wake another year and thus help to swell the field.

The Officers of the Royal Army Veterinary Corps., Aldershot Command were "At Home" and the teas provided were greatly appreciated by hosts of friends. Amongst those present we noticed the following members of the Corps :—

Major-General and Mrs. H. T. Sawyer, Colonel W. S. and Mrs. Anthony, Colonel and Mrs. Digby Bolton, Colonel A. A. Olver, Mrs. J. J. Aitken, Major W. C. Lowe, Major G. T. T. Jackson, Major and Mrs. H. Greenfield, Major and Mrs. H. J. Holness, Major and Mrs. F. C. O'Rorke Major and Mrs. H. Kirby, Major J. R. Hodgkins and family, Major and Mrs. R. Porteous, Major and Mrs. W. H. Simpson, Major and Mrs. R. W. Mellard, Major and Mrs. V. C. Leckie, Major and Mrs. A. S. Lawrie, Major E. Hearne, Major W. B. Howe, Major and Mrs. G. Oxspring, Mrs. E. G. Turner, Mrs. G. S. Walker, Captain and Mrs. B. J. W. Nicholas, Captain R. Scott, Mr. I. D. Macrae, and Mr. C. U. K. Porter.

Rissaldar Mohd. Yasin Khan (A.D.C. to the Commander-in-Chief, India) and Jemadar Shad Mohd. Khan, of the Indian Army Veterinary Corps, who are with the Polo ponies of the Indian Army team at Aldershot, for America, were interested spectators and welcomed guests.

Obituary.

Tailby, M. C., Dalton Street, Birmingham. Graduated London, 14th May, 1895. Died 4th May, 1927.

John William Hayes, M.R.C.V.S.

An Appreciation.

By F. J. McCall, M.R.C.V.S., Dar es Salaam, Tanganyika Territory.

The death of John William Hayes, M.R.C.V.S., at Iver, Bucks., England, on January 18th, 1927 (previously noted in the *Record*) removes from our midst a young man of a type which the Service, the profession, and his fellow men could ill afford to lose.

Six years ago as District Veterinary Officer, at Arusha, he took over the care of the herds and flocks of the Masai, the most important pastoral tribe in Tanganyika Territory, and found rinderpest and pleuro-pneumonia rampant—herds decreasing—threatened starvation. To-day the problem is to know what to do with the increase.

Few men have been better known and trusted in Masailand than the late Captain Hayes. His name in many ways was one to conjure with among the wild tribesmen of this little known region. Ever on the move attending the needs of his far-flung district; visiting his stock inspectors and native guards on many a lone patrol—advising, cajoling, insisting—his was a busy life. Many young men of administrative and scientific ability undoubtedly exist in our profession, but seldom does any one individual combine with these capabilities a scholarly, modest, generous and kindly nature to such a marked degree as did Jack Hayes. A big man physically and in every sense of the word, his familiar figure will be sadly missed.

Graduating at Dublin in December, 1915, he saw Active Service in the North-Western Frontier of India prior to joining the Tanganyika Civil Veterinary Department. His death at the early age of 34 leaves many to mourn his loss, cherish his memory, and sympathise with his bereaved wife and child.

Experiments on Animals.

In the House of Commons on May 4th, Lord Banbury asked what was the number of inspectors appointed under the Cruelty to Animals Act, 1876. He said that, according to the Home Secretary, there were only two whole-time inspectors, and the last time on which they interfered in order to prevent an animal suffering prolonged and agonising pain was on March 25th last year. There were 242 places licensed to perform experiments on animals. More than 200,000 experiments were performed in the year 1925, and 9,402 of them were done without anæsthetics. At University College alone 1,147 dogs were experimented on in two years, and yet the number of inspectors was only two.

Lord Desborough, Captain, Yeomen of the Guard, who replied for the Home Office, said he did not think evasion or violation of the law need be taken seriously into account. Licence-holders did sometimes commit breaches of the Act and of the conditions of their licence, but that was almost invariably due to failure to understand the somewhat intricate and technical points of this legislation. Wilful evasion was practically unknown. From the point of view of efficiency of administration, a larger staff of inspectors was undoubtedly desirable, but, bearing in mind the continued need for economy, he could not hold out any hope that the Home Office would approach the Treasury for further money to be spent in this direction.

Viscount Haldane, who was heard with difficulty, was understood to say that he could bear out; with such experience as he had, Lord Desborough's statement that there was very little violation of the law. He thought a certain amount of experiments on animals was absolutely essential.

Viscount Knutsford said that the 209,000 experiments that took place were not all experiments that needed inspection; it was not thought necessary that the inspectors should be present at all the operations. They could not make any experiment on an animal except at a licensed place. There were only 267 places licensed in all England and Scotland, and the vast number of these were all in one building. They wanted laboratories inspected, and two whole-time men could, in the opinion of a great number of people, do the work perfectly well.

Foot-and-Mouth Disease.

In the House of Commons on Monday, in reply to Mr. Day, Mr. Guinness, Minister of Agriculture, said that from January 1st to May 7th, 1927 inclusive, 23 outbreaks of foot-and-mouth disease had been confirmed in England and Wales in eight separate districts. Replying to Captain Crookshank, Mr. Guinness said that he thought there was strong evidence that these very satisfactory figures were due to the embargo on foreign meat. For the second time this year the country was now free from local restrictions. No recent cases had been notified.

Royal (Dick) Veterinary College Appeal.

The difficulty of the three Scottish Agricultural Colleges and the Royal (Dick) Veterinary College, in securing the 33⅓ per cent. of local contributions towards their maintenance expenditure, required by H.M. Treasury, was referred to at a recent meeting of the Finance Committee of the Aberdeen County Council.

The Clerk read a letter from the Governors of the Royal (Dick) Veterinary College, Edinburgh, appealing for assistance towards the maintenance expenses of the College, The letter stated that it was giving the Governors grave concern that the local contributions towards the net maintenance expenditure of the College fell greatly short of the 33⅓ per cent. required by the Treasury. The Governors had striven and were striving to conduct the College with the strictest economy consistent with efficiency, and they therefore viewed with anxiety the possibility of a reduction in the amount of the grant from the Treasury, and more especially did they do so at the present time, when increasing demands were being made upon the educationa! and other resources of the College.

The Clerk reported that no assistance was given in reply to an appeal last year.

It having been moved and seconded that no assistance be given, Mr. H. D. M'Combie, Kemnay, said that, as they knew, the Government had laid down a new condition that 33⅓ per cent. of the maintenance expenses of the Colleges must be contributed locally. This placed an impossible burden on the Colleges unless aid from the Education Authorities and the County Councils was given. Other counties were giving contributions from the County Councils since that new development arose. It was a very serious position not only for the "Dick" College, but for the three Scottish Agricultural Colleges. He thought that they might give some small assistance to the "Dick" College. That county was as much interested in veterinary science as any county in Scotland. He thought it was only their duty to do something to come to the rescue of the College. He moved that they give £10.

The Chairman suggested that they should get information as to how many County Councils and Education Authorities were giving subscriptions before they finally decided. If they gave and the Education Authority gave it was coming out of the same pocket—the ratepayers—and there might be overlapping. The matter could come up at their next meeting.

Mr. Park said he had every sympathy with the College, but there was no use crying about economy and not practising it.

The Chairman's suggestion was adopted.—*Aberdeen Press and Journal.*

The Editor acknowledges the receipt of the following :—

Report of a meeting of the Southern Counties Division, from Mr. J. Facer, Hon. Secretary.

Communications from Capt. T. J. Bosworth (Cambridge), Messrs. E. G. Conisbee (Axminster) and R. L. Higgins (London), Miss D. Knight (Reading) and Mr. A. Shoshan (Royal Veterinary College, London).